

**FINAL  
ENVIRONMENTAL ASSESSMENT  
AND FINDING OF NO SIGNIFICANT IMPACT**

**RED BLUFF DIVERSION DAM  
PILOT PUMPING PLANT PROGRAM**

Prepared by  
U.S. Department of the Interior  
Bureau of Reclamation  
Mid-Pacific Region  
Sacramento, CA

August 1993

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Pilot Pumping Plant Program

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United States Department of the Interior

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Sacramento, California

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RED BLUFF DIVERSION DAM  
PILOT PUMPING PLANT PROGRAM

Recommended:

Richard C. Kestey  
Study Manager

Concur:

Frank J. Michney  
**ACTING** Regional Environmental Officer

Approved:

Dan M. Fitts  
**ACTING FOR** Regional Director

Date: August 11, 1993

FONSI No. 93-05-MP

FINDING OF NO SIGNIFICANT IMPACT  
RED BLUFF DIVERSION DAM PILOT PUMPING PLANT PROGRAM

In accordance with the National Environmental Policy Act of 1969, as amended, the Mid-Pacific Regional Office of the U.S. Bureau of Reclamation (Reclamation) has determined that an environmental impact statement is not required for the Red Bluff Diversion Dam (RBDD) Pilot Pumping Plant (PPP) Program.

Reclamation is proposing to assist salmonid populations while meeting the basic project purpose of the RBDD and the Tehama Colusa Canal (TCC) by implementing the Red Bluff Diversion Dam Pilot Pumping Plant Program. The design and placement of the pilot pumping plant has been developed by Reclamation in conjunction with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game.

The project consists of the installation of a pilot pumping plant immediately downstream of the RBDD which will include one helical pump (100 cubic feet per second (cfs)) and two closed Archimedes screw pumps (100 cfs, each). It is expected that the Archimedes pumps will allow fish to pass through them with minimal impact. The impact of helical pumps are uncertain, but will be evaluated as part of this program. An additional pump either helical or Archimedes (100 cfs) may be added in the future.

The pilot pumping plant is proposed to begin operating in December of 1994. The normal annual operating period will run from September 15 to May 14. This would facilitate gates of the diversion dam to be up for an additional two months of the year, when compared to historical operations and thus allow for essentially unimpeded fish passage for this period of time. The pumps themselves are expected to have minimal impact on juvenile fish (25 mm and larger) migrating downstream. Impacts will be minimized by monitoring at the evaluation facility and implementing appropriate corrective measures, as necessary, through flexibility designed into the pilot pumping plant. This would include activities such as speed control, exchangeability of the trashrack, intake bell housings, vertical screens, operational flexibility of the bypass system and other features.

This project is expected to help prevent further loss of the threatened winter-run chinook salmon and facilitate continued delivery of water in the TCC. Without implementation of this program, and the continuation of normal operations at the Red Bluff Diversion Dam, a further decline in this species may occur and recovery may be inhibited.

The following are the reasons why the impacts of the proposed action are not significant:

1. The normal operation of the Red Bluff Diversion Dam will not be adversely impacted during the construction period and efforts to minimize impact on the

environment will be taken at every opportunity. Sheet pile will be installed to provide hydraulic isolation that will eliminate any disturbance of the river from construction.

2. Borrow material will be taken from an existing borrow area previously used by Reclamation. This site is serviced by a permanent road approximately 3/4 mile long. No threatened or endangered species occur at this site. Approximately 9,000 cubic yards of free draining material will be obtained here. No additional disturbance of the existing borrow area will occur.

3. The project will not affect public safety. All necessary precautions will be taken during the construction period. Traffic control will be utilized where necessary. Traffic on the road to access the construction site and the borrow area will be appropriately controlled by flagmen and warning signs during the construction period.

4. There will be no long-term adverse affects to fish. After construction, long-term effects of the PPP may help prevent further decline of the salmonid population while allowing the continuation of the basic project purpose of the RBDD and the TCC. The new base operation conditions required for the Central Valley Project includes maintenance of the RBDD gates in an uninterrupted raised position from September 15 to May 14. The PPP would allow flexibility to meet this requirement and still meet water delivery requirements.

5. There will not be any impact on the following Federally listed threatened, endangered or candidate species: the winter-run chinook salmon, (Oncorhynchus tshawytscha), the Valley Elderberry Longhorn Beetle (VELB), (Desmocerus californicus dimorphus), the Northwestern pond turtle, (Clemmys marmorata), the bald eagle, (Haliaeetus leucocephalus), Sacramento splittail, (Pogonichtys macrolepidotus), the green sturgeon, (Acipenser medirostris), the California red-legged frog, (Rana aurora draytonii), silky cryptantha, (Cryptantha crinita) and the adobe lily, (Fritillaria pluriflora).

6. Any vegetation, which may exist at the construction site, downstream of RBDD, will be replanted to replace that lost due to construction activity.

7. Recreation may be disrupted during the construction period. However, following completion of the pilot pumping plant, extended gates-up operation will allow for additional benefits to be realized by sport fishermen if, as expected, a subsequent improvement in salmonid population results. The formation of Lake Red Bluff will occur after the gates of the RBDD are closed, beginning in mid-May before the Memorial Day holiday.

8. The project will not adversely affect water quality. Construction specifications will include a water quality management plan to minimize any impacts.

9. There will be no adverse impact from noise to the area surrounding the construction site.

10. The RBDD Pilot Pumping Plant will be located in an area completely altered by the construction of the Tehama Colusa Canal. A survey of the general area has been performed for cultural resources and none exist at the proposed site. In the unlikely occurrence that cultural resources are encountered after the project has begun, the procedures in 36 CFR 800.11 would be followed. The contractor would cease work at that location and notify Reclamation. Reclamation's Regional Archeologist would assess the nature and value of the site and would recommend to the State Historic Preservation Officer (SHPO) a course of action. Appropriate mitigation, as determined through negotiations with SHPO, would be completed for any significant sites.

11. There is no long term adverse impact to social and economic conditions that may result with the installation of the PPP at RBDD.

12. A need was identified to generate greater sweeping flows past the Red Bluff Diversion Dam Pilot Pumping Plant. Changes in the design of the PPP have been incorporated in order to generate these flows past the PPP intake. The changes include repositioning the intake (a 9 degree rotation which moves the upstream end of the intake about 5 feet and the downstream end about 30 feet further into the river).

The implementation of additional measures to achieve increased flows will be initiated following construction of the PPP. Initially, five possible courses of action were suggested to facilitate greater sweeping flows at the intake of the PPP. These options include:

- 1) gate manipulations at RBDD;
- 2) dredging of the site above and below RBDD, and;
- 3) use of groins or other channel control structures in the river;
- 4) constricting the channel cross section above the dam; and
- 5) a combination of the above.

Continued hydraulic model studies combined with comments from the first and second revised Draft Environmental Assessment (EA) review have led Reclamation to select a version of number 5) above as the channel modification option recommended for implementation. This option incorporates gate manipulation at RBDD with limited upstream dredging, has comparable flow manipulation benefits to the other channel modification options considered, and can be achieved at minimum cost, with no in-river construction. Only if this option fails to provide the necessary sweeping flows would other options be considered. A detailed explanation of the selected option as well as the other alternatives considered is provided in Appendix E of the EA. All options, other than the selected gate manipulation combined with upstream dredging, will be subject to separate environmental documentation at a later date, depending on their scope and nature.

FINAL  
ENVIRONMENTAL ASSESSMENT

Red Bluff Diversion Dam  
Pilot Pumping Plant Program

Prepared by  
U.S. Department of the Interior  
Bureau of Reclamation  
Mid-Pacific Region  
Sacramento, CA

August 1993

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### Summary

This Environmental Assessment (EA) has been prepared to assess the environmental effects of the construction and operation of a Pilot Pumping Plant (PPP) Program proposed by the Bureau of Reclamation (Reclamation) at the Red Bluff Diversion Dam (RBDD). The purpose of the program is to provide information for evaluation and refinement of the performance characteristics of the two types of pumps. As an added benefit, the continued delivery of water in the Tehama Colusa Canal (TCC) will be ensured while reducing the impact to anadromous fish associated with the historical operation of the RBDD.

Following construction of the Red Bluff Diversion Dam in 1964, and the subsequent closure of the gates in August of 1966, there has been a marked decrease in the anadromous salmonid population of the upper Sacramento River. Of specific concern has been the pronounced decline in the numbers of the winter-run chinook salmon (winter-run) Oncorhynchus tshawytscha which has been federally listed as a threatened species. These population declines have necessitated the implementation of a variety of measures to arrest a further decline of, and to assist recovery of salmonid populations.

One of the proposed measures to assist salmonid populations is the Red Bluff Diversion Dam Pilot Pumping Plant Program. The design and placement of the pilot pumping plant has been developed by the Bureau of Reclamation in conjunction with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. The pilot pumping plant, along with the no action alternative, are the two alternatives considered in this EA.

The project consists of the installation of a pilot pumping plant immediately downstream of the RBDD which will include one helical pump (100 cubic feet per second (cfs)) and two closed Archimedes screw pumps (100 cfs, each). It is expected that the Archimedes pumps will allow fish to pass through them with minimal impact. The impact of helical pumps is uncertain, but will be evaluated as part of this program. An additional pump, either helical or Archimedes, (100 cfs) may be added in the future.

A decision was made by Reclamation to provide all water users with the same amount of water as previously allocated. However, the Biological Opinion issued by the National Marine Fisheries Service now requires that the gates be opened an additional two months each year. Historic "gates-up" operations have been from November 1 through April 30. The new period has been stipulated as September 15 through May 14, and will be in effect beginning in 1994. These dates were based on the premise that the PPP would be completed and operating, beginning in October of 1993. Although completion of the PPP has been delayed to December, 1994, Reclamation is still required to meet these dates, which are the new base operation conditions for the Central Valley Project. When operational, the PPP will help insure that an adequate water supply will be made available to irrigation districts, wildlife refuges, and other water users. However, during construction, there will be times when the gates must be operated to accommodate construction activities. This could occur intermittently during mid-March through April, 1994 when gates on the



right river bank may be closed to accomodate cofferdam construction, and again in late August, 1994 when the cofferdam is removed. Additional closing of the gates on the right bank may occur for up to four hours about once per month to aid divers checking cofferdam stability. Lake Red Bluff will not be reinstated prior to April 30, 1994. Reclamation is currently re-initiating consultation with the National Marine Fisheries Service to reach agreement on how these operational changes during construction should be carried out, so that the water delivery commitments along the TCC may be met, and fishery needs accommodated, until the PPP is fully operational.

Pursuant to the following schedule, the gates of Red Bluff Diversion Dam must remain in the raised position to provide unimpeded upstream and downstream passage for winter-run chinook salmon:

- a. The gates of Red Bluff Diversion Dam must remain in the raised position through at least April 30, 1993.
- b. The gates of Red Bluff Diversion Dam must be raised on November 1, 1993 and remain in the raised position through at least April 30, 1994.
- c. On September 15 of each year commencing in 1994, the gates of Red Bluff Diversion Dam must be raised and remain in the raised position from September 15 through at least May 14.

NMFS will review proposals for intermittent gate closures of up to 10 days, one time per year, on a case-by-case basis. Reclamation recently reinitiated consultation with NMFS for activities related to construction of the pilot pumping plant but the request was not to change the essence of the above schedule.

The PPP would allow flexibility in meeting existing requirements without severely restricting water deliveries during this period. Thus, the normal annual gates-up operating period will run from September 15 to May 14. This would allow the gates of the diversion dam to be up for an additional two months of the year, thus allowing for essentially unimpeded fish passage during this period of time. The pumps themselves are expected to have minimal impact on juvenile fish (25 mm and larger) migrating downstream. Impacts will be minimized by monitoring at the evaluation facility and implementing appropriate corrective measures, as necessary, through flexibility designed into the pilot pumping plant, such as pump speed control, exchangeability of the trashracks, intake bell housings, vertical screens, and operational flexibility of the bypass system and other features.

#### **Additional features of the RBDD PPP Alternative**

A need has been identified to generate greater sweeping flows past the Red Bluff Diversion Dam Pilot Pumping Plant. Changes in the design of the PPP will be incorporated in order to generate these flows past the PPP intake. The changes include repositioning the intake (a 9 degree rotation which moves

the upstream end of the intake about 5 feet and the downstream end about 30 feet further into the river).

Additionally, during the construction phase for the PPP, the fish screens for the temporary pumps will be removed prior to cofferdam construction, beginning in mid-March or early April 1994, and will remain out through late summer. It is anticipated that pumping will occur during the gates-up portion of this time period, as necessary, to meet water delivery needs. Screens will be replaced prior to pumping for the TCC canal when the gates are raised on September 15, 1994.

The implementation of additional measures to achieve increased flows will be initiated following construction of the PPP. Five possible courses of action have been suggested to facilitate greater sweeping flows at the intake of the PPP. A primary option consisting of gate manipulation (selective gate operation) and limited upstream dredging has been identified as the alternative that will be implemented initially. Only if this option fails to provide the necessary sweeping flows would other options be considered. A detailed explanation of all alternatives is provided in Appendix E of the Environmental Assessment.

All channel modifications other than selective gate operations combined with upstream dredging will be subject to separate environmental documentation at a later date depending on their scope and nature, as developed and determined to be necessary, to generate adequate sweeping flow past the PPP.

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## GLOSSARY

- cfs - Cubic Feet Per Second
- DFG - California Department of Fish and Game
- DWR - California Department of Water Resources
- EA - Environmental Assessment
- FWS - U.S. Fish and Wildlife Service
- NMFS - National Marine Fisheries Service
- RBDD - Red Bluff Diversion Dam
- PPP - Pilot Pumping Plant
- Fines - Silt and clay particles of less than .062 mm in diameter.
- Groins - Any structure built into the water to protect against erosion or to establish normal channel widths; also to direct the axis of flow to promote scour.
- Thalweg - Line connecting the lowest or deepest point along a streambed (flow line).

## INTRODUCTION

After construction of the Red Bluff Diversion Dam (RBDD) in 1964 and with the subsequent closure of the dam gates in August of 1966, there has been a marked decrease in anadromous salmonid populations of the upper Sacramento River. Of specific concern has been the pronounced decline in numbers of the winter-run chinook salmon which has been Federally listed as a threatened species. These population declines have necessitated the implementation of a variety of measures to arrest a decline of the salmonid population. One of the measures proposed to assist salmonid populations while still facilitating the delivery of water into the TCC, is the Pilot Pumping Plant (PPP) program.

Reclamation is currently involved in a long range fish passage study at the Red Bluff Diversion Dam. The objectives of this study are to improve passage for both downstream and upstream migrating chinook salmon and steelhead trout, to maintain water supply capability and to prevent adverse impacts in other areas. The pilot pumping plant supports this effort. (Please refer to Figure 1).

This EA has been integrated with environmental review and consultation requirements of the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historical Preservation Act and Federal policies on farmland, wetlands and floodplains. Preparation of the EA has been coordinated with affected Federal, State and local resource agencies including the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), the California Department of Fish and Game (DFG), California Department of Water Resources (DWR), and the California State Regional Water Quality Control Board (State Board).

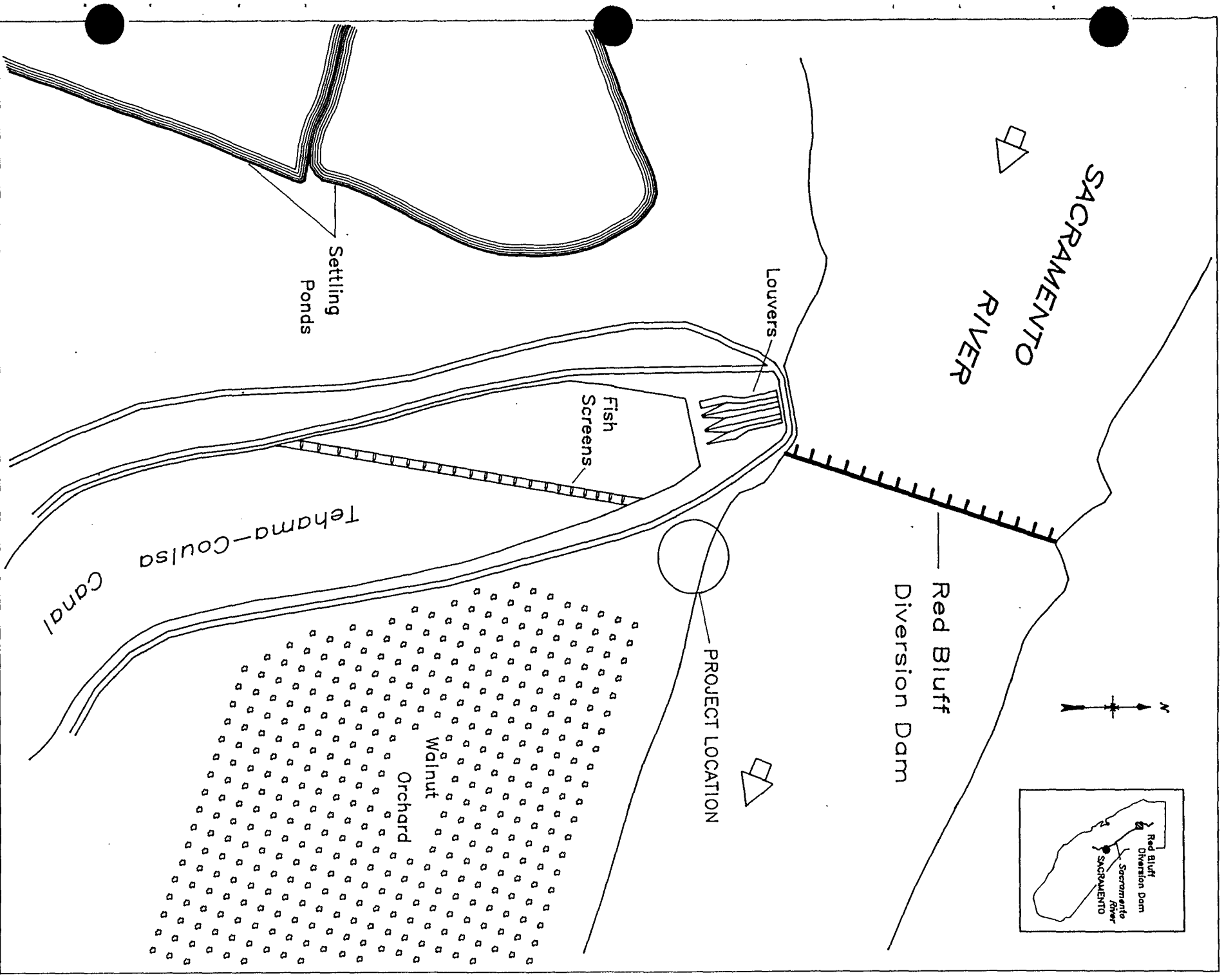
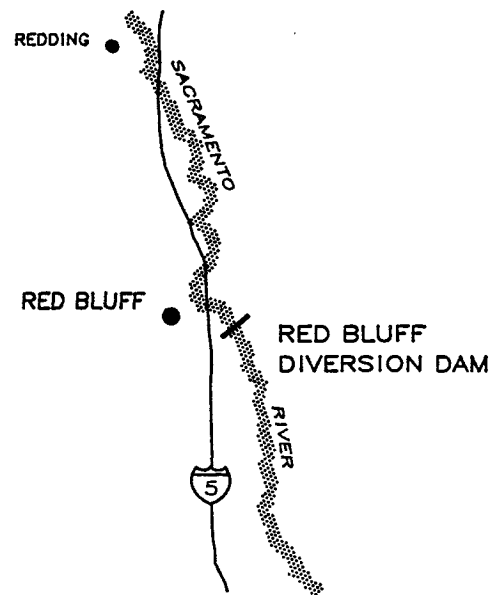
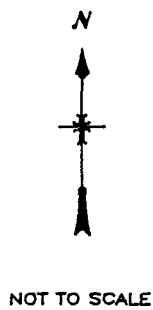


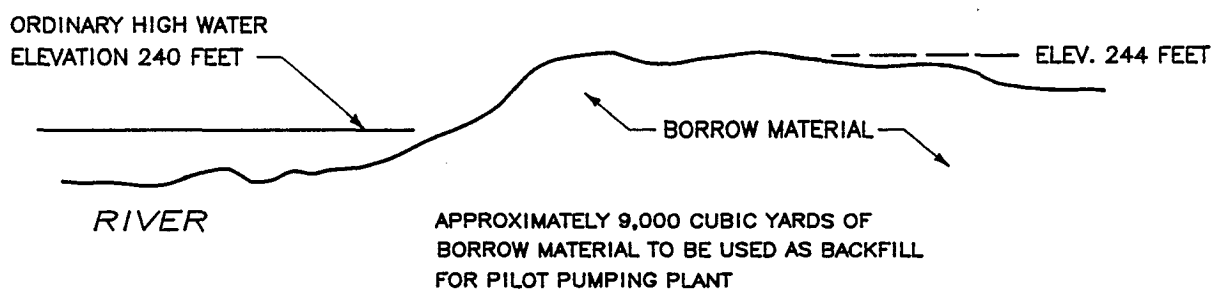
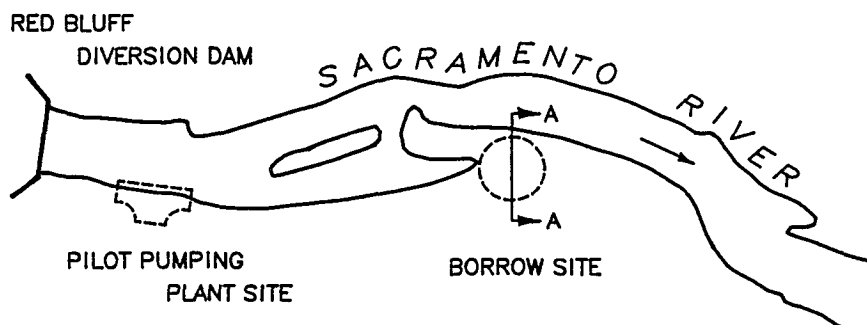
Figure 1

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## AREA MAP



## SECTION A - A

### PROPOSED BORROW SITE

RED BLUFF  
PILOT PUMPING  
PLANT

SACRAMENTO RIVER  
U.S. Bureau of Reclamation  
Willows, California

Figure 2

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# ARCHIMEDES SCREW PUMP

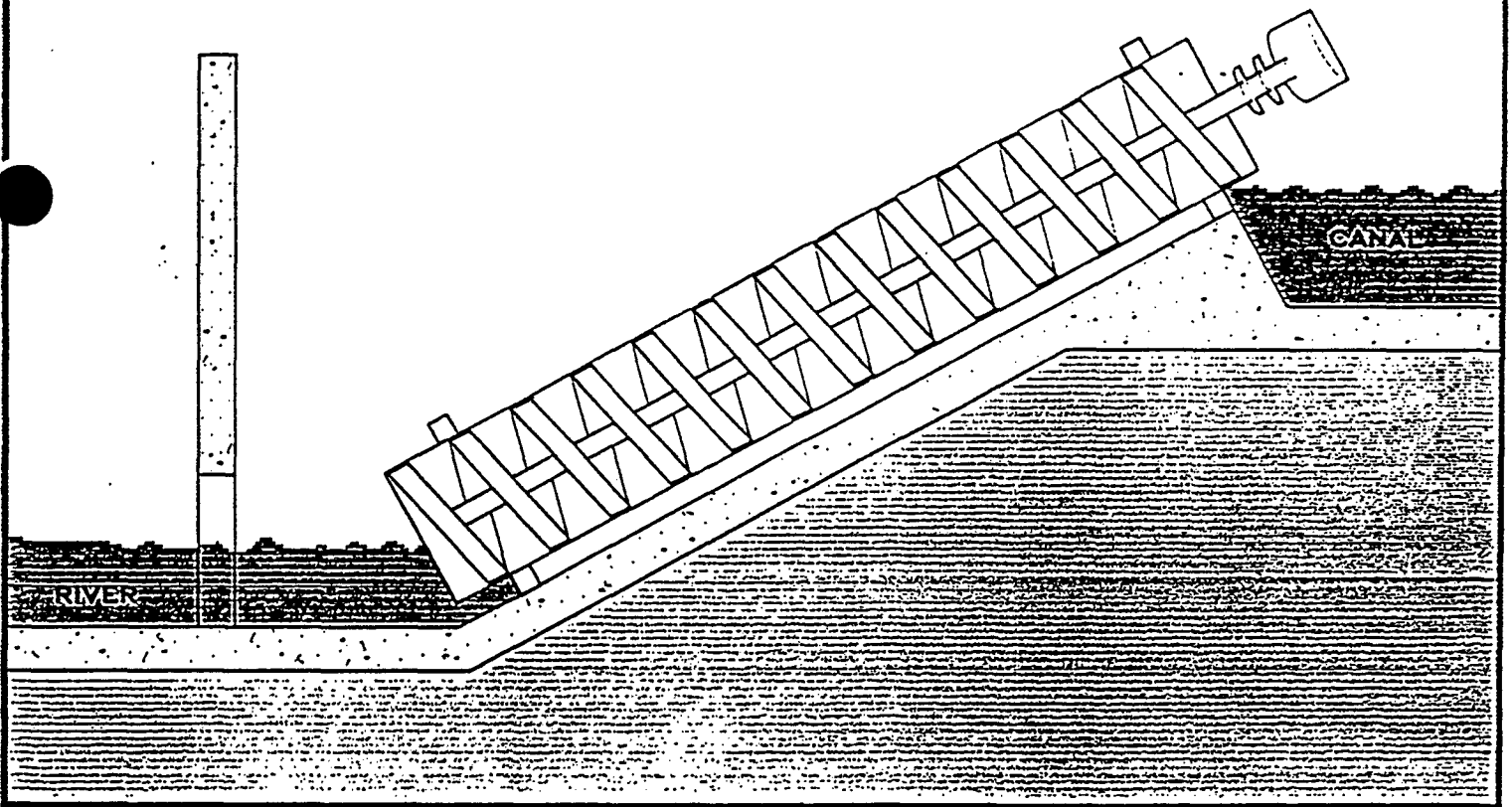
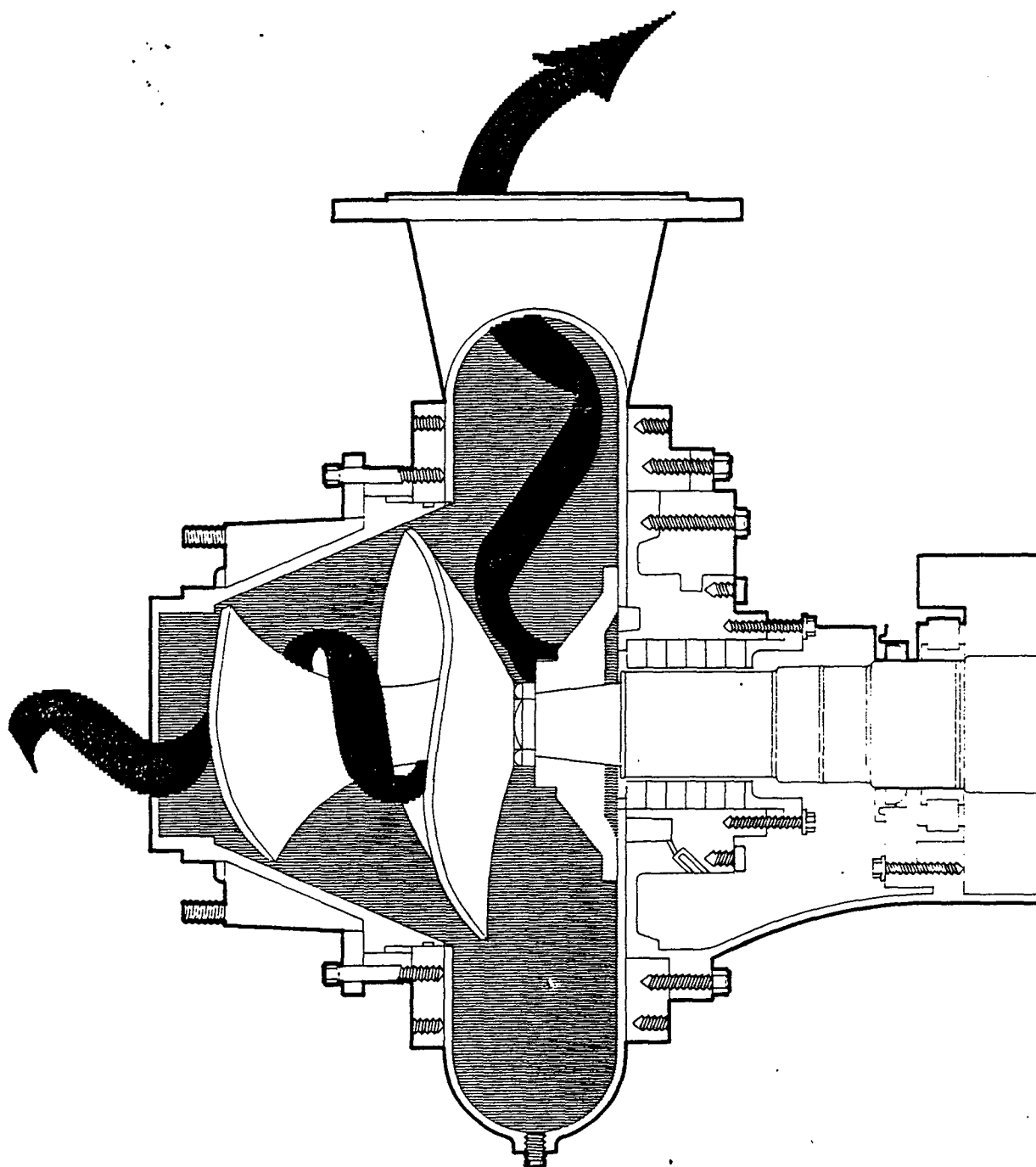


Figure 3



## HELICAL PUMP

Figure 4

## PURPOSE AND NEED

The RBDD Pilot Pumping Plant program was initially proposed by Reclamation and is concurrently being developed with the Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS) and the California Department of Fish and Game (DFG) in order to minimize the impacts on winter-run chinook salmon until a permanent, long range solution to correct fishery problems has been implemented. It would serve to provide for evaluation and refinement of the performance characteristics of the two types of pumps. (Please refer to Figures 2 and 3). Additional secondary benefits to other salmonids will also be realized as a result of this project. (Please refer to Tables 1 - 6).

Ongoing consultation under section 7 of the Endangered Species Act (ESA) addressing Central Valley Project (CVP) operations includes consideration of operations at RBDD. A Biological Opinion provided for long-term operation of the CVP included extended opening of gates at RBDD as a routine annual mode of operation. The construction of the pilot pumping plant would allow Reclamation to meet these ESA requirements while still allowing the basic project purpose to proceed. Reclamation did not anticipate the delay in the construction of the PPP with its completion in December, 1994. Reclamation is currently re-initiating consultation with the National Marine Fisheries Service to reach agreement on operational changes that may be needed during construction to meet water delivery commitments along the TCC until the PPP is fully operational.

Pursuant to the following schedule, the gates of Red Bluff Diversion Dam must remain in the raised position to provide unimpeded upstream and downstream passage for winter-run chinook salmon:

- a. The gates of Red Bluff Diversion Dam must remain in the raised position through at least April 30, 1993.
- b. The gates of Red Bluff Diversion Dam must be raised on November 1, 1993 and remain in the raised position through at least April 30, 1994.
- c. On September 15 of each year commencing in 1994, the gates of Red Bluff Diversion Dam must be raised and remain in the raised position from September 15 through at least May 14.

NMFS will review proposals for intermittent gate closures of up to 10 days, one time per year, on a case-by-case basis. Reclamation recently reinitiated consultation with NMFS for activities related to construction of the pilot pumping plant but the request was not to change the essence of the above schedule.

The currently proposed program is the culmination of meetings and discussions that have been held with interested parties of Federal, State and local resource agencies as well as interested citizens and private organizations. The significant issues considered and deemed necessary for the program were the biological and operational criteria indicated previously. These are the

unimpeded passage of fish during the extended gates-up operation, and reduced mortality of those that would be pumped through the proposed pumps.

TABLE 1

List of Common and Scientific Names of Fishes That Could  
Potentially be Encountered at the Proposed Prototype Pumping  
Facility at Red Bluff Diversion Dam, California

Common Name	Scientific Name
Lampreys	Petromyzontidae
Pacific lamprey	Lampetra tridentata
Sturgeons	Acipenseridae
Green sturgeon	Acipenser medirostris
White sturgeon	Acipenser transmontanus
Herrings	Clupeidae
American shad	Alosa sapidissima
Threadfin shad	Dorosoma petenense
Trout and Salmon	Salmonidae
Chinook salmon	Oncorhynchus tshawytscha
Steelhead/Rainbow trout	Oncorhynchus mykiss
(perhaps rarely: Coho, Pink, and Chum salmon; Brown trout)	
Minnows	Cyprinidae
Carp	Cyprinus carpio
Sacramento squawfish	Ptychocheilus grandis
Roach	Hesperoleucus symmetricus
Hitch	Lavinia exilicauda
Sacramento blackfish	Orthodon microlepidotus
Hardhead	Mylopharodon concephalus
Golden shiner	Notemigonus crysoleucas
Suckers	Catostomidae
Sacramento sucker	Catostomus occidentalis
Catfishes	Ictaluridae
White catfish	Ictalurus catus
Channel catfish	Ictalurus punctatus
Bullheads	Ictalurus sp.
Livebearers	Poeciliidae
Mosquitofish	Gambusia affinis
Sticklebacks	Gasterosteidae
Threespine stickleback	Gasterosteus aculeatus

Above information from several sources: Moyle, 1976; Dick Painter,  
California Dept. of Fish and Game, Personal Communication; Robins et al., 1980  
(Common and Scientific Names); Numerous USFWS Documents of RBDD.

Common and Scientific Names of Fishes (Continued)

Common Name	Scientific Name
Sea basses	Percichthyidae
Striped bass	<i>Morone saxatilis</i>
Sunfish and Black Basses	Centrarchidae
Green sunfish	<i>Lepomis cyanellus</i>
Redear	<i>Lepomis microlophus</i>
Bluegill	<i>Lepomis macrochirus</i>
Largemouth bass	<i>Micropterus salmoides</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Surfperches	Embiotocidae
Tule perch	<i>Hysterocarpus traski</i>
Sculpins	Cottidae
	<i>Cottus</i> sp.

Table 2  
Generalized Approximate Timing Patterns Of Various Life History Activities  
Of The Four "Runs" of Chinook Salmon In The Sacramento River, California

Life History Activity	Fall Run	Late Fall Run	Winter Run	Spring Run
Adult Migrations	July 1 - Mid-Dec (Peak = Sept)	Late Oct - Apr 10 (Peak = late Dec)	Dec 15 - July 5 (Peak = Mar-Apr)	Mar 20 - Oct 5 (Peaks in May - July)
Spawning	Oct 1 - Late Dec (Peak = all of Nov)	Jan 1 - Apr 15 (Peak = Late Feb)	Apr 16 - Aug 15 (Peak = Late May - Early June)	Aug 16 - Oct 15
Egg Incubation	Oct 1 - End of Mar	Jan 1 - End of June	Apr 15 - Oct 15	Aug 10 - Dec 31
Rearing and Downstream Migration	Late Dec - End of June (Peak for Smolts = May; Peaks for Fry, or 35-45 mm Fish, Occur With Freshets in Jan-Feb)	Apr 10 - Dec 15 (Peak=Early July)	July 10 - Mar 15	Nov 1 - May 5

Data Summarized From Vogel and Marine 1991.



TABLE 3

Biweekly Counts of Adult Fish Migrating Upstream Through  
Fish Passageways at Red Bluff Diversion Dam  
During May 5, 1991, Through November 30, 1991

Time Period (1991)	Chinook Salmon	Steelhead Trout	American Shad	Sacramento Squawfish
May 5 - May 18	104	5	0	684
May 19 - June 1	156	0	0	891
June 2 - June 15	283	1	4	427
June 16 - June 29	309	1	1	166
June 30 - July 13	732	0	5	90
July 14 - July 27	1,891	5	5	230
July 28 - Aug 10	980	3	0	17
Aug 11 - Aug 24	3,709	9	0	22
Aug 25 - Sept 7	4,754	45	0	17
Sept 8 - Sept 21	7,624	149	0	35
Sept 22 - Oct 5	9,087	463	0	43
Oct 6 - Oct 19	7,164	882	5	391
Oct 20 - Nov 2	4,314	883	0	78
Nov 3 - Nov 16	2,055	699	0	182
Nov 17 - Nov 30	2,237	247	0	4
Totals	45,399	3,392	20	3,277

Data Taken From USFWS Fish Counts Conducted by the Northern Central Valley  
Fishery Resource Office. Daily Counts Taken from 6 a.m. to 8 p.m.

Data Sheets Provided at Bureau of Reclamation Offices at Red Bluff by  
Joe Van Aelst.

TABLE 4

Total Counts of Numbers of Adult Fish Migrating Upstream Through Fish Passageways at Red Bluff Diversion Dam During December 1, 1983, Through April 30, 1984, and December 1, 1984, Through April 30, 1985

Species	Dec 1, 1983 to Apr 30, 1984	Dec 1, 1984 to Apr 30, 1985
Chinook Salmon	6,681	8,116
Steelhead Trout	268	599
American Shad	0	0
Sacramento Squawfish	16,173	6,767

Data Provided by Jerry BigEagle, USFWS, Northern Central Valley Fishery Resource Office, Red Bluff, California. Daily Counts Taken from 6 a.m. to 8 p.m.

TABLE 5

Monthly Average and Range of Estimated Numbers of  
Downstream Migrating Juvenile Chinook Salmon Approaching  
Red Bluff Diversion Dam (Data from July 1982 Through June 1986)

Month	Average	Range
July	825,700	188,924 - 2,540,591
August	129,080	7,994 - 163,922
September	140,785	67,842 - 295,264
October	202,500	37,657 - 396,317
November	1,030,240	364,003 - 2,537,494
December	6,446,520	374,271 - 15,046,336
January	14,361,360	1,135,293 - 27,381,824
February	21,672,920	1,226,132 - 67,840,478
March	3,562,780	363,416 - 8,105,593
April	4,590,740	1,014,640 - 6,223,675
May	11,709,740	1,973,206 - 22,365,055
June	6,846,295	448,926 - 14,125,511

Data Summarized From: United States Fish and Wildlife Service, 1988. Fish Passage Action Program for Red Bluff Diversion Dam. Final Report Appendices, USFWS Report No. FR1/FAO-88-19.

# ALTERNATIVES:

This chapter contains a description of the preferred alternative, the no action alternative and the alternatives that were considered but were not selected. The key considerations used in evaluating the suitability of each alternatives were fish passage (minimizing mortality and optimizing unrestricted passage) and water delivery (minimizing the impact of possible reduced water deliveries to existing users).

From these key considerations, the following set of criteria were developed: (Criteria (a) through (c) are for evaluating the pumps and criteria (d) is nonessential to pump type selection.)

## a. Biological - to have minimal impact on fish passage.

Biological criteria was deemed to be of paramount importance. Therefore design specifications and operational considerations would have to be developed which would enable the optimum number of fish to pass the RBDD unimpeded. A corollary requirement for this criteria is optimizing the survival rate and minimizing the mortality rate of the fish that would be pumped and returned to the river.

## b. Water delivery capability - to maintain normal water delivery, to the maximum extent possible.

A decision was made by Reclamation to provide all water users with the same amount of water as previously allocated. However, the Biological Opinion issued by the National Marine Fisheries Service now requires that the gates be opened an additional two months each year. Historic "gates-up" operations have been from November 1 through April 30. The new period has been stipulated as September 15 through May 14, and will be in effect beginning in 1994. These dates were based on the premise that the PPP would be completed and operating, beginning in October of 1993. Although completion of the PPP has been delayed to December, 1994, Reclamation is still required to meet these dates, which are the new base operation conditions for the Central Valley Project. When operational, the PPP will help insure that an adequate water supply will be made available to irrigation districts, wildlife refuges, and other water users. However, during construction, there will be times when the gates must be operated to accommodate construction activities. This could occur intermittently during mid-March through April, 1994 when gates on the right river bank may be closed to accomodate cofferdam construction, and again in late August, 1994 when the cofferdam is removed. Additional closing of the gates on the right bank may occur for up to four hours about once per month to aid divers checking cofferdam stability. Lake Red Bluff will not be reinstated prior to April 30, 1994. Reclamation is currently re-initiating consultation with the National Marine Fisheries Service to reach agreement on how these operational changes during construction should be carried out, so that the water delivery commitments along the TCC may be met, and fishery needs accommodated, until the PPP is fully operational.

- c. System reliability - to ensure operation of at least one Archimedes screw pump at all times, a minimum of two pumps will be installed.

For system reliability, the requirement to have at least one Archimedes screw pump in operation at all times made it imperative that two pumps would have to be installed in the event of one Archimedes pump malfunctioning or for routine maintenance.

- d. Evaluation opportunity - to allow performance assessment of more than one type of pump.

This criteria required the PPP to allow for the performance assessment of two different pumps. Hence, a helical pump was included in the design.

### Selection of the Alternatives

Each of the alternatives considered were evaluated based upon whether it met the set of criteria listed above. For those that met all the criteria, the biological benefits to be derived were calculated and ranked. The selection was made based on this ranking.

#### No Action Alternative:

The no action alternative would result in gates-up operation for the period of September 15 through May 14, as required by the Biological Opinion addressing long-term operation of the CVP. Historic "gates-up" operations have been from November 1 through April 30. The new period has been stipulated as September 15 through May 14, and will be in effect beginning in 1994. These dates were based on the premise that the PPP would be completed and operating, beginning in October of 1993. Although completion of the PPP has been delayed to December, 1994, Reclamation is still required to meet these dates, which are the new base operation conditions for the Central Valley Project.

This alternative would not include the addition of any new structures or changes in existing operations at RBDD. In 1991 and 1992 five temporary pumps were installed at RBDD to enable delivery of water with gates-up operation. The operation of these five conventional pumps (25 cfs, each) with a total capacity of 125 cfs, would provide a limited supply of water to users along the TCC when gates are up. Additionally, four portable, submersible pumps (10 cfs, each) were added in 1992 to supplement gates-up operation and to ensure water supply.

#### Pilot Pumping Plant Alternative:

Reclamation is proposing to construct and operate a pilot pumping plant using a combination of pumps of varying speeds. Construction is anticipated to begin in April of 1994. The proposed operational date for the pilot pumping plant would be in December of 1994.

The pilot pumping plant program consists of a combination of one helical (centrifugal) pump (100 cfs) and two closed Archimedes screw pumps (100 cfs, each). Limited previous evaluation indicates that the Archimedes screw pumps allow fish to pass through them with minimal impact. An additional pump either helical or Archimedes, (100 cfs) may be added in the future. Also included would be the continued operation of five conventional pumps with screened intakes. Reclamation intends to operate only those pumps that can be screened. Repositioning of the PPP inlet structure allows space for placement of four sets of screens, not five sets as initially planned. Therefore, only four of the five conventional pumps can be operated and only 100 cfs capacity will be realized, not the 125 cfs as originally intended.

The PPP, once it is completed, will provide a total of 300 cfs, with 270 cfs for water delivery and 30 cfs redirected to the fish bypass. Peak capacity of 370 cfs would potentially be available during 243 days of operation. During this time the RBDD gates would be open beginning September 15 through May 14.

A decision was made by Reclamation to provide all water users with the same amount of water as previously allocated. However, the Biological Opinion issued by the National Marine Fisheries Service now requires that the gates be opened an additional two months each year. Historic "gates-up" operations have been from November 1 through April 30. The new period has been stipulated as September 15 through May 14, and will be in effect beginning in 1994. These dates were based on the premise that the PPP would be completed and operating, beginning in October of 1993. Although completion of the PPP has been delayed to December, 1994, Reclamation is still required to meet these dates, which are the new base operation conditions for the Central Valley Project. When operational, the PPP will help insure that an adequate water supply will be made available to irrigation districts, wildlife refuges, and other water users. However, during construction, there will be times when the gates must be operated to accommodate construction activities. This could occur intermittently during mid-March through April, 1994 when gates on the right river bank may be closed to accommodate cofferdam construction, and again in late August, 1994 when the cofferdam is removed. Additional closing of the gates on the right bank may occur for up to four hours about once per month to aid divers checking cofferdam stability. Lake Red Bluff will not be reinstated prior to April 30, 1994. Reclamation is currently re-initiating consultation with the National Marine Fisheries Service to reach agreement on how these operational changes during construction should be carried out, so that the water delivery commitments along the TCC may be met, and fishery needs accommodated, until the PPP is fully operational.

The location for the pilot pumping plant is approximately 300 feet downstream of the RBDD on the right bank. The discharge water from all pump units would enter a separation facility where the fish are concentrated by a vertical screen and moved into the bypass flow to the evaluation facility. Most of the water (without fish), will be conveyed to the canal. The water from the bypass will flow through the evaluation facilities where there will be an inclined screen fish separator which will move fish into the holding tanks. Here, the condition of the fish can be monitored and the number and type of fish can be recorded. A video camera would be used for this surveillance. When the bypass flow is not being sampled, the fish will be conveyed via

separate 18-inch bypass pipes, which will be connected to the existing 60-inch bypass pipe, to allow easy diversion of the fish back to the river.

One of the primary purposes of this alternative is to design a test facility that minimizes salmonid mortality while allowing a thorough assessment of the appropriateness of this type of facility as a long term solution. However, even with the best initial design, subsequent evaluation may find unpredicted, unforeseeable sources of salmon mortality. Reclamation is committed to working with the participating agencies to correct, to the extent practicable, any design and/or operational sources of salmon mortality found during the evaluation studies (See Appendix F).

The project will be operated in two phases. During the first phase, the facility's principal purpose will be to allow an experimental evaluation of the potential for a larger facility of this type as a long-term solution, such as described in the Red Bluff Diversion Dam Fish Passage Program Appraisal Report. During this first phase, the facility will also be able to supply irrigation water and allow the RBDD gates to remain up for a longer period and subsequently benefit salmonid fish passage.

Depending on the outcome of this evaluation and other planning decisions, (such as the RBDD Appraisal Study), the project might enter a second phase in which it would be used as a conveyance facility to provide benefits to fish and water users.

The summary list of environmental commitments that Reclamation would implement as part of the pilot pumping plant alternative can be found in Appendix A - Environmental Commitments List.

#### Additional features of the RBDD PPP Alternative

A need has been identified to generate greater sweeping flows past the Red Bluff Diversion Dam Pilot Pumping Plant. Changes in the design of the PPP will be incorporated in order to generate these flows past the PPP intake. The changes include repositioning the intake (a 9 degree rotation which moves the upstream end of the intake about 5 feet and the downstream end about 30 feet further into the river).

Additionally, during the construction phase for the PPP, the fish screens for the temporary pumps will be removed prior to cofferdam construction, beginning in mid-March or early April 1994, and will remain out through late summer. It is anticipated that pumping will occur during the gates-up portion of this time period, as necessary, to meet water delivery needs. Screens will be replaced prior to pumping for the TCC canal when gates are raised on September 15, 1994.

Operational and design constraints of the PPP may require additional changes to the operation of the RBDD and the PPP as required by two Biological Opinions issued by the NMFS. For the temporary pumps these constraints include the following:

The fish screens must be removed prior to cofferdam construction because they are located within the cofferdam work area. The screens are large and bulky and would congest the space required for sheet pile placement. The screens must be in that location because the temporary pumps have been constructed there. The screens must have a large surface area to accomodate a slow approach velocity requirement of .33 feet/second and to get the required flow through them.

Reclamation is currently in the process of re-initiating consultation with NMFS to address this required change in the operation of the RBDD.

The implementation of additional measures to achieve increased flows will be initiated following construction of the PPP. Five possible courses of action have been recommended to facilitate greater sweeping flows at the intake of the PPP. A primary option consisting of gate manipulation (selective gate operation) and limited upstream dredging has been identified as the alternative that will be implemented initially. Only if this option fails to provide the necessary sweeping flows would other options be considered. A detailed explanation of all alternatives is provided in Appendix E of the Environmental Assessment.

All channel modifications that require structures in the river or extensive rechannelization will be subject to separate environmental documentation at a later date depending on their scope and nature, as developed and determined to be necessary, to generate adequate sweeping flow past the PPP.

Alternatives considered but eliminated from detailed study:

The alternatives considered but eliminated involved the operation of combinations of at least one or multiple sets of archimedes screw pump(s) with and without a helical pump. These alternatives included the existing pumps (125 cfs) to be operated in conjunction with a combination of the helical and archimedes screw pumps. These alternatives were compared in relation to operational constraints; specifically the number of days that the gates would be open. This information, was evaluated in relation to the number of winter-run chinook salmon that would normally be present with unrestricted passage. These alternatives were not selected because although they met all of the criteria, they were not cost effective.



## ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES CONSIDERED

## No Action Alternative

The no action alternative would not address the problem of the declining number of winter-run chinook salmon. According to the California Department of Fish and Game, the estimate for the winter-run chinook salmon for 1992 was expected to be 1,180 adults. This estimate is up from an all time low of 191 returning in the 1991 season. Despite this year's gain, there is concern for future winter-run chinook salmon runs, particularly the progeny produced from the 191 adults.

## Pilot Pumping Plant Alternative

The greatest potential impact during construction activities would take place during the installation of the sheet pile. However, after the sheet pile is installed, the resulting hydraulic isolation would prevent any further disturbance of the river.

The borrow area for the free draining material, to be used for building the cofferdam, will be located at a site further downstream. This site was previously used by Reclamation as a borrow area for another project. It is serviced by a permanent road approximately 3/4 mile long. No cultural resources or threatened and endangered species of vegetation or wildlife occur at this site. Approximately 9,000 cubic yards of free draining material will be obtained here. No additional disturbance will occur at this site.

Sheetpile installation is to be completed by the end of April. The addition of rip rap to strengthen both sides of the sheetpiling may occur at this time. With adherence to timely contracting procedures and with favorable weather conditions permitting, installation of the sheetpiling may begin earlier so that meeting the April 30 completion date may be assured.

(Please refer to the Environmental Commitments List, Appendix A, for a detailed discussion of the measures Reclamation has adopted in order to minimize environmental impact during various stages of construction).

This alternative would improve conditions for the winter-run chinook salmon as well as for other salmonid populations. In addition, this alternative would allow continued water deliveries to the water users, such as the irrigation districts and wildlife refuges, and will provide biological design data for a possible permanent pump installation. This alternative allows for greater unimpeded passage for fish by facilitating "gates-up" operation (Table 6).

Also with the PPP alternative, the risk of building a full scale pumping plant that may harm, rather than benefit fish will be avoided.

**Table 6 Summary of Benefits to Salmon From Extended "Gates Up" Operation  
at RBDD Resulting From the Construction of the PPP  
(These benefits were calculated using both wet and dry year passage  
data at RBDD)**

**From: Vogel, D.A. and K.R. Marine, 1991**

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**% Unimpeded  
Passage at RBDD  
Upstream adults**

	<b>Fall</b>	<b>Late Fall</b>	<b>Winter</b>	<b>Spring</b>
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<b>No Action Alternative *</b>	10	71	84	7
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<b>Pilot Pumping Plant Alternative **</b>	55	100	90	12
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**% Unimpeded  
Passage at RBDD**

<b>Downstream juveniles</b>	<b>Fall</b>	<b>Late Fall</b>	<b>Winter</b>	<b>Spring</b>
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<b>No Action Alternative *</b>	77	15	60	98
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<b>Pilot Pumping Plant Alternative **</b>	89	28	68	98
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\* For the purposes of this analysis, the no action alternative assumed historical operation of the RBDD and was also based on the assumption that the PPP would be completed by October of 1993.

\*\* For the PPP alternative - the PPP would allow flexibility to meet the present CVP operational requirements and facilitate an additional number of days with gates-up operation. Thus, the normal annual operating period will be from September 15 to May 14, an additional two months, when compared to historical operations.

Reclamation's proposal to include a biological study, such as the one described earlier, will provide an opportunity for monitoring and evaluation. The inclusion of this proposed study or of any final study will allow for the immediate mitigation of any adverse impacts that may be experienced by the affected species.

Additional impact from the PPP may result as changes are incorporated to achieve greater sweeping flow. These include repositioning the intake (a 9 degree rotation which moves the upstream end of the intake about 5 feet and the downstream end about 30 feet further into the river.)

Additionally, during the construction phase for the PPP, the fish screens for the temporary pumps will be removed prior to cofferdam construction, beginning in mid-March or early April 1994, and will be replaced prior to pumping for the TCC canal when gates are raised on September 15, 1994. It is anticipated that pumping may occur during the gates-up portion of this time period, as necessary, to meet water delivery needs.

The implementation of additional measures to achieve increased sweeping flows at the intake will be initiated following construction of the PPP. Five possible courses of action have been suggested to facilitate greater sweeping flows at the intake of the PPP. A primary option consisting of gate manipulation (selective gate operation) and limited upstream dredging has been identified as the alternative that will be implemented initially. Only if this option fails to provide the necessary sweeping flows would other options be considered. A detailed explanation of all alternatives is provided in Appendix E of the Environmental Assessment.

All channel modifications that require structures in the river or extensive rechannelization will be subject to separate environmental documentation at a later date depending on their scope and nature, as developed and as determined to be necessary, to generate adequate sweeping flow past the PPP.

Both the no action and the proposed alternatives are evaluated for their impact on various resources in Table 7 which follows.

Table 7 - Comparison of Alternatives

Resource/Area of Impact	Proposed Alternative	No Action Alternative *
Fish	Provide protection for fish while facilitating project purpose to continue	No effect on fish
Recreation	Drought conditions & gates up operation may result in change from current year seasonal usage	No change in current seasonal usage
Vegetation & Wildlife	Minimal impact	No change
Hydrology/Water Quality	Short term impacts due to construction	No change
Noise	Short term impacts due to construction	No change
Cultural/ Historical	No significant cultural resources	No significant cultural resources
Social & Economic Considerations	Beneficial effect for water users	No change

\* For the no action alternative - the base operation conditions for the Central Valley Project - Operations Criteria and Plan (CVP-OCAP), is the maintenance of the RBDD gates in an uninterrupted raised position from September 15 - May 14.

## AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following is a discussion of the environmental consequences for the affected resource.

## FISH:

## Affected Environment

## Threatened and Endangered Species

The winter-run chinook salmon is the only listed threatened species of fish that may be affected by this proposal. Effects on this species are discussed in the following paragraphs.

## Fish

During the period of construction (April - December 1994) four races of chinook salmon (fall, late fall, winter and spring) could be present adjacent to the construction site either as adults migrating upstream or as outmigrant fry, juveniles or smolts. Additionally, steelhead, lampreys, sturgeon (green and white), shad, minnow, squawfish, catfish, sucker, mosquitofish, stickleback, striped bass, sunfish and bass could also be present. A complete list of these fish species that may be encountered at the construction site is presented in Table 1. The Sacramento sucker and Sacramento squawfish are present in high numbers near the RBDD during certain seasons and the squawfish is a significant predator of juvenile salmon. Predation by the squawfish below RBDD contributes significantly to the mortality of downstream migrating juvenile salmonids.

## Environmental Consequences

Operations in 1992 involved gates-down operation from May 1 to November 1. During part of the construction period (April - December 1994) that would occur for the pumping plant alternative, it is anticipated that the gates at RBDD would be closed. As a result, fish passage at RBDD would be impeded during this period due to construction activity. The impediment will be limited to the period when sheetpiling is being installed or removed. Upstream passage of fish, however, is possible via two of three fish ladders (west, center, east).

Additionally, during the construction phase for the PPP, the fish screens for the temporary pumps will be removed prior to cofferdam construction, beginning in mid-March or early April 1994, and will be replaced prior to pumping for the TCC canal when the gates are raised on September 15, 1994. It is anticipated that pumping will occur during the gates-up portion of this time period, as necessary, to meet water delivery needs.

Analysis of migration timing of winter-run chinook salmon (Vogel, 1991) suggests that on the average 69 percent of the adult winter run chinook salmon would have migrated past RBDD by April 1, when construction is anticipated to commence. It is possible therefore that up to 31 percent of the adults may

migrate past the project site during construction activities. These estimates may change somewhat in any given year, as timing of migration is variable and is dependent on downstream flow, water temperature, and whether it is a wet or dry year. The greatest potential impact during construction would take place during the installation of the sheet pile. However, after the sheet pile is installed, the hydraulic isolation that will result would prevent any further disturbance of the river. Downstream passage will be accomplished by fish passing beneath the gates of RBDD or through the existing screened bypass of the TCC Facility.

Construction of the PPP will facilitate the gates remaining open for two additional months each year compared to historic operations. This will reduce the overall impact on fish passage.

#### VEGETATION AND WILDLIFE:

##### Affected Environment

##### Threatened and Endangered Species

Elderberry shrubs are host to the Valley Elderberry Longhorn Beetle, (VELB), (Desmocerus californicus dimorphus), which is listed as an endangered species. If elderberry exists on the site, they must be protected from physical damage resulting from contractor operations. If contract requirements compel removal of elderberry shrubs, a Section 7 consultation with the FWS will be initiated. The proposed site of the PPP has been previously cleared during construction activity that occurred for the Tehama Colusa Canal Fish Screen Project. One of the corrective actions to which Reclamation was committed was the replacement of elderberry shrubs that were affected. The replanted shrubs however, were not successfully re-established and consequently, elderberry shrubs are not currently present. Reclamation intends to replant replacement elderberry shrubs at an adjacent site.

The Northwestern pond turtle, (Clemmys marmorata marmorata) is a Category 2 candidate for Federal listing and is also a State Species of Concern. It occurs in the area but is not affected by the project. Factors that have contributed to its decline include historical commercial exploitation, alteration of aquatic and adjacent upland habitats, introduction of predators, population fragmentation, and drought (Holland and Bury, 1992). Also listed as an endangered species is the bald eagle, (Haliaeetus leucocephalus). Other candidate species include the Sacramento splittail, (Pogonichthys macrolepidotus), the green sturgeon (Acipenser medirostris), the California red-legged frog, (Rana aurora draytonii), silky cryptantha, (Cryptantha crinita) and the adobe lily (Fritillaria pluriflora). Due to the location and nature of the project and the absence of suitable habitat at the project site, Reclamation has determined that the construction and operation of the pilot pumping plant will not affect these species.

## Vegetation

The predominant natural plant communities near RBDD are valley grassland and riparian vegetation. Grassland, which prevails in the hilly terrain on either side of the river, is characterized by annual grasses interspersed with oak woodlands. Much of this community has been replaced by agriculture; predominantly in the form of orchards. The riparian vegetation bordering the river includes cottonwoods, willows, alders, sycamores, and an understory of blackberries and other woody shrubs. In the immediate vicinity of RBDD, riparian vegetation is sparse. Much of it has been removed as a result of development and flood control activities along the river.

The actual construction site is steeply sloped (2 to 1) and is vegetated predominantly with grasses, star thistle, wild oats, wild grapes, a few small willows and a black walnut tree. The site is bordered by the Sacramento River to the left and a service road to the right. Near the site a sheet pile structure is present, beginning at the end of the west fish ladder. The southern boundary of the project site is bordered by a water quality monitoring station.

## Wildlife

The riparian corridor along the Sacramento River near RBDD supports a variety of wildlife, even though the surrounding area is highly developed for agricultural and urban uses. Existing vegetation and shorelines in the project area provide a suitable environment for blacktailed deer, raccoon, weasel, gray fox, badger, muskrat, jackrabbit, cottontail, tree and ground squirrel, striped and spotted skunk, beaver, and river otter. Many species of waterbirds, waterfowl, raptors, gamebirds, and songbirds frequent the area. These species, many of which are migratory, include the mourning dove, California quail, pheasant, wood duck, great blue heron, great egret, belted kingfisher, golden eagle, band-tailed pigeon, and acorn woodpecker. Previous construction activities at the RBDD have resulted in conditions at the project site where species that may once have been present are no longer evident.

## Environmental Consequences

The proposed alternatives would not significantly affect the species discussed in the previous section, including the Northwestern pond turtle. Specifically, the construction and operation of the pilot pumping plant would occur in an area exhibiting minimal habitat values.

While the Northwestern pond turtle occurs in the area, construction of the RBDD PPP should not impact this species because the construction site is too steep and is unsuitable for nesting. This species prefer nesting sites out of the channel proper and requires a soft soil that allows females to excavate and deposit eggs 6-8 inches deep (Personal conversation 7/10/92, Hartwell Welsh, Redwood Sciences Laboratory). In addition, the Northwestern pond turtle hibernates in upland sites from the fall until about April, thus insulating itself from much of the proposed operational activities.

Construction of the RBDD PPP would require the removal of several small willows and the black walnut tree. Other vegetation on site, which creates riparian habitat, or serves to control erosion, should be preserved to the extent possible. All land surfaces having vegetative removal should be suitably replanted to prevent subsequent erosion. (Please refer to the Environmental Commitments List, Appendix A, for a more detailed discussion of construction activity).

## RECREATION:

### Affected Environment

Throughout the Sacramento River basin, recreation and tourism are considered to be very important and growing economic activities. The Sacramento River is nationally recognized for its diverse recreation opportunities. Construction of RBDD has significantly affected the recreation patterns of the local community. For example, RBDD created Lake Red Bluff which created an opportunity for lake oriented recreation and motorized boating in particular. On the other hand, RBDD reduced the opportunity for recreational fishing in the Sacramento River at the lake and further upstream. Visitors and residents use Lake Red Bluff and adjacent lands for fishing, boating, swimming, jet skiing, camping, picnicking, photography, nature viewing, boat racing and sight seeing. The high-use period at the lake begins in early May and extends through the Labor Day weekend.

Federal, State, county, and city governments and private industry have been instrumental in providing recreation facilities and opportunities at the lake. Six public recreation areas have been developed adjacent to the reservoir. These areas, provide a variety of services and account for most of the visitor use.

### Environmental Consequences

The proposed alternative would, if implemented, facilitate gates-up operation for an additional two months of the year. However, the period of recreation available with the formation of Lake Red Bluff during gates down operation would last approximately four months and coincide with the high-use period. Current operations would be relatively unchanged and consequently, recreation is expected to be minimally impacted.

The no action alternative would not involve any change in the normal period of operation. The base operation conditions for the Central Valley Project - Operations Criteria and Plan (CVP-OCAP), is the maintenance of the RBDD gates in an uninterrupted raised position from September 15 to May 14.



## HYDROLOGY AND WATER QUALITY:

### Affected Environment

The water quality of the Sacramento River at RBDD varies throughout the year. Average water temperature in the river near the dam is 50 degrees Fahrenheit in winter and 58.5 degrees Fahrenheit in the summer. The water is suitable for most domestic and industrial uses and is classified as class 1 for irrigation use. Quality is somewhat poor during heavy runoff because of an increase in suspended sediment.

None of the characteristics of Sacramento River water at RBDD, except water temperature, violates State water quality standards or objectives. Water temperatures immediately above the dam during summer and fall are high and are considered the most important water quality factor controlling survival, development and growth of fish eggs and juvenile fish. Since 1987, water temperatures above the dam have been controlled to the extent possible by releasing colder water from Shasta Reservoir during summer and fall, when cooler temperatures are required for growth and survival of the winter-run fry.

Although there is an accumulation of sediment in the river at RBDD, particularly during high flows, it does not cause water quality problems. The sediment load of the river is contributed by tributary inflow, bank erosion, and development along the river.

### Environmental Consequences

The proposed alternative would result in a temporary and minor degradation of the water quality in the immediate vicinity of the pilot pumping plant during construction. After operation of the PPP begins, however, the two additional months of gates-up operation may result in cooler water for that period as the warming effect of the reservoir is eliminated.

During construction, Reclamation guidelines would be followed to minimize the effects of lower water quality that may result in the Sacramento River. All construction work would be performed by methods that would prevent accidental spillage or entrance of solid matter or other pollutants or wastes into the water. Additionally, all precautions would be taken to comply with Federal and State standards regarding turbidity that could result in the river. There should be no net effect on water quality following construction of the pilot pumping plant. These precautions would also apply to activity in the river during removal of the cofferdam.

Although the greatest potential impact during construction will take place during the installation of the sheet pile, the hydraulic isolation that will result after its installation will prevent any further disturbance of the river. In addition, the Contractor would be required to comply with applicable Federal, State, and local laws, orders, regulations, and water quality standards concerning the control and abatement of water pollutants.

Additionally, the Contractor's construction activities would be performed by methods that would prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants into streams, whether flowing or dry watercourses. Precautions shall be taken to prevent excavated material from being washed away by high water or storm runoff.

The Contractors's methods of dewatering, unwatering, excavating or stockpiling of earth and rock materials will include appropriate measures to control siltation. Wastewater from general construction activities, such as drainwater collection, drilling, grouting, or other construction operations, would not be permitted to enter watercourses without the use of approved turbidity control methods. These methods may include, but are not restricted to: interception ditches, settling ponds, gravel-filter entrapment dikes, flocculating processes, recirculation, or combinations thereof.

The no action alternative would not result in a marked change in the water quality given normal operating procedures. The only changes that may occur would be the result of the drought.

#### NOISE:

##### Affected Environment

RBDD lies in the unincorporated area of Tehama County, and a local noise ordinance is nonexistent. Currently, Caltrans is constructing a bridge upstream from the dam site in a residential area. Construction is allowed as close as 150 feet from the nearest residence. Therefore, the proposed construction of the pilot pumping plant is not subject to any restrictions.

##### Environmental Consequences

For the proposed alternative, all construction activity would take place on Bureau of Reclamation property. Construction activity to install the pilot pumping plant, would occur approximately two and one-half miles from the nearest residence and approximately one mile from a hospital. Construction activity would be too far away to affect them.

The no action alternative would not result in any construction activity, and noise will not be a problem, other than what may occur during normal operations at the dam.

#### CULTURAL AND HISTORICAL:

##### Affected Environment

The vicinity of the Sacramento River is an important cultural resource. It was the area of the most concentrated populations in Western North America of aboriginal peoples, who used the resources of the river for food and shelter. Later peoples - Spanish, Mexicans, Europeans - who settled the area, used the river for transportation and for a water supply to develop farms, cities, and industries.

In the reach of the river between Anderson and Red Bluff, there are 60 recorded archeological sites. Most are near the city of Red Bluff. One is listed in the California Historical Plan. California Historical Landmarks in the immediate vicinity of Red Bluff are Mrs. John Brown's House, and the Ide Adobe, which is also listed on the National Register.

The RBDD PPP will be located in an area completely altered by the construction of the TCC. Prior surveys, and subsequent studies made in the area of potential effect, found no evidence of cultural resources.

#### Environmental Consequences

Both the proposed alternative and the No Action Alternative would not affect any known cultural resource sites in the area. In addition, there are no other existing facilities eligible for historic recognition.

If any cultural resources are encountered during construction, all work in the area of the find would be halted until it is evaluated by the Regional Archeologist or his designated representative, and the State Historic Preservation Officer has been consulted (36 CFR 800.11).

#### SOCIAL AND ECONOMIC CONSIDERATIONS:

##### Affected Environment

Historically, the county's economy has been based on the development and use of two of its natural resources - abundant forests and grazing lands with fertile soils. As more people settled in the county, manufacturing of forest and agricultural products became increasingly important.

Also providing employment in the more urbanized areas, particularly in the city of Red Bluff, are wholesale and retail trades, services, and public administration. In recent years, recreation and tourism have become important sources of new jobs throughout the county.

Although the population of Tehama County (estimated at 49,735 for 1990) is expected to increase in the future, growth rates are expected to decline. Most people live in communities along the major highways in the central part of the county. The greater Red Bluff area will remain the population center of the county, and development of land along the river at Red Bluff for recreational and residential purposes will continue.

Since RBDD was constructed, residential areas and some commercial enterprises have been developed along the shoreline of Lake Red Bluff. It is likely that many of these residential and commercial developments would have occurred with or without the lake, as river-front properties are very valuable because of the esthetics. One existing problem is the appearance of bare zones that occur as water levels recede. This is caused by both seasonal changes in water flow and by the operation of the dam.

Electrical power for the PPP will be supplied from existing Central Valley Project (CVP) resources. The new pilot project pumping loads will necessitate incremental power generation for Federal CVP power customers. We estimate this impact to be negligible.

#### Environmental Consequences

The proposed alternative, would have a beneficial effect for those water users along the TCC receiving water deliveries during the eight months of gates-up operation. The combination of both the helical and Archimedes screw pumps in coordinated operation with the existing pumps would help ensure adequate delivery of water.

For the no action alternative, gates-up operation would take place during November 1 through April 30, with existing pumps in operation. Water deliveries would remain unchanged from current operations at RBDD.

For both the pilot pumping plant alternative and the no action alternative, the receding water levels would continue to cause unattractive bare zones around the lake. However, as discussed above, many of these residential and commercial developments would have occurred with or without the Lake. For both alternatives, the Red Bluff-Tehama County Chamber of Commerce Boat Drag Races would not be affected, because gates would be down during the Memorial Day weekend, thereby ensuring the formation of the lake.

For the proposed alternative, there may be a small risk of potential impact on environmental quality due to incremental fossil fuel power generation. The impacts associated with this risk are assumed to be negligible.

**GROWTH INDUCING IMPACTS:**

The PPP is not intended to increase the amount of water diverted, but rather to change the mechanism by which it is diverted, from gravity to pumped water, thereby permitting extended gates-up operation of the dam. Existing water delivery and existing authorized CVP delivery will be maintained during eight month of the year. No new development is proposed. Therefore, project implementation would not have any significant growth-inducing impacts. Construction activities associated with the project may temporarily generate a small number of jobs. The project is not expected to increase the possibility of land use changes downstream of the RBDD.

**UNAVOIDABLE ADVERSE EFFECTS:**

No significant unavoidable adverse impacts would occur with the construction and operation of the RBDD pilot pumping plant. During cofferdam construction, fish screens for the temporary pumps will be removed. Some pumping will occur during gates-up operation, around April - May, 1994.

**RELATIONSHIP OF SHORT TERM USES AND LONG TERM PRODUCTIVITY:**

Construction activities would be short-term. Less than five acres would be temporarily utilized for construction, with approximately two acres of land to be permanently covered by project facilities.

The proposed pilot pumping plant may provide for the long-term pumping needs of water users affected by the RBDD. Depending on the outcome of the evaluation and other planning decisions (such as the RBDD Appraisal Study), the project might enter a second phase in which it would be used as a long-term, non-experimental facility. As an added benefit, it may increase the survival rate of all runs of chinook salmon with gates-up operation which would occur eight months of the year.

**IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES:**

See discussion above. Project implementation would involve the irreversible commitment of manpower, energy, and materials necessary to complete construction.

## CONSULTATION AND COORDINATION:

### Scoping Process

Interagency design sessions were held at various locations including the Sacramento and Red Bluff offices of the Bureau of Reclamation. Participants included representatives from Reclamation, FWS, CDFG and NMFS.

The first Draft EA was issued to local, State and Federal agencies and concerned publics in November, 1992. The second draft EA which incorporated all of the proposed modifications necessary, was issued to local, State and Federal agencies and concerned publics in June, 1993.

### Endangered Species Act Consultation

Consultation has occurred with the FWS and the NMFS, pursuant to Section 7 of the Endangered Species Act. Reclamation requested a listing from the FWS and NMFS of endangered and threatened species that might be affected by the construction and operation of the pilot pumping plant. The FWS provided a list of listed, proposed and candidate species on August 3, 1992.

Reclamation has prepared a biological assessment of the project area. Based on the assessment and analyses in this EA, Reclamation has determined that the construction and operation of the pilot pumping plant would not affect any of the species identified by the FWS if outlined mitigation measures are undertaken. Reclamation is seeking concurrence on this determination.

The biological assessment was also provided to NMFS to initiate consultation on the winter-run. A non-jeopardy opinion was issued on February 2, 1993. A re-initiation of consultation is currently in progress to include the proposed changes (i.e. channel modification).

Reclamation will survey the staging area and provide survey results to FWS and continue coordination pursuant to the Endangered Species Act as required.

### Fish and Wildlife Coordination Act

The FWS provided comments to Reclamation on the proposed project through a planning aid memorandum on September 4, 1992 reviewing the Draft EA. The FWS indicated that the EA adequately describes the wildlife and sensitive plant resources that would be affected by the proposed action.

FWS also provided a draft Fish and Wildlife Coordination Act (FWCA) Report on July 16, 1993. This draft report states the FWS's support of the Red Bluff PPP Program and includes nine recommendations relative to the construction and operation of the PPP. Due to the accelerated schedule for this project, FWS will finalize the Coordination Act Report after the comment period ends for the draft FWCA Report on August 16, 1993. Discussions with FWS have indicated that the recommendations in the draft FWCA Report will not change substantially when the report is finalized.

The recommendations provided by FWS for the most part are minor project modifications that are already incorporated into the project, or monitoring studies that Reclamation has planned to implement. Reclamation intends to comply with, or incorporate all of the recommendations in the Draft FWCA Report.

**U.S. Army Corps of Engineers - Section 404 Nationwide Permit  
(Dredge and Fill Permit)**

Reclamation is currently in the process of consulting with the U.S. Army Corps of Engineers on the need for a Clean Water Act, Section 404, dredge and fill permit.

**California Department of Fish and Game - Section 1601 Lake and Streambed  
Alteration Agreement**

Reclamation is currently in the process of applying for this agreement.

**State Regional Water Quality Control Board - Water Quality Certification  
(Section 401, Clean Water Act)**

Reclamation has obtained this certification.

**National Historic Preservation Act**

Based on field examinations and in-house record searches, including the National Register of Historic Places and recent updated records, there is no evidence of cultural resources immediately downstream of the project site. Reclamation is continuing consultation with the California State Historic Preservation Officer (SHPO). Reclamation has requested concurrence from the SHPO that no impact to cultural resources are expected to occur under the proposed action.

**Farmland Protection Act**

No prime or unique farmlands will be affected by the proposed action.

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**APPENDIX A**  
**ENVIRONMENTAL COMMITMENT LIST**

**C - 0 6 5 7 9 7**

C-065797

## ENVIRONMENTAL COMMITMENT LIST

The following is a summary list of environmental commitments that Reclamation would implement as part of the proposed alternative to lessen the effects on the environment. Additionally, Reclamation is committed to working with the participating agencies to correct to the extent practicable any design and/or operational sources of salmon mortality found during the evaluation studies.

1. Construction will begin in April, which would have the least impact on the winter-run in the Sacramento River adjacent to the proposed construction site.

The borrow area for the free draining material to be used for building the coffer dam, will be located at a site further downstream. This site was previously used by Reclamation as a borrow area for another project. It is serviced by a permanent road approximately 3/4 mile long. No endangered species of vegetation or wildlife occur at this site. Approximately 12,000 cubic yards of free draining material will be obtained here. No additional disturbance will occur at this site.

Sheetpiling installation is scheduled to be completed by end of April. The addition of rip rap to strengthen both sides of the sheetpiling may occur at this time. With adherence to timely contracting procedures and with favorable weather conditions permitting, installation of the sheetpiling may begin earlier so that the April 30 completion date may be assured.

During some phases of construction, work may take place at night, which will require lighting portions of the river at the construction site. This may affect fish in the vicinity by increasing the predation factor, especially of juveniles. Reclamation intends to minimize the need and the frequency of such lighting during construction.

2. Topsoil at the embankment area will be stockpiled, prior to excavation, for use in revegetation at the site. Embankment hauling will be limited to a maximum number of trucks at a frequency to be determined, in order to minimize highway traffic impacts.

3. All roads will be maintained during construction and repaired, as necessary, following completion of construction. Temporary roads should be scarified after restoring their cross section to their original grades. Surface drainage should be installed, where necessary, to avoid hydraulic rutting and soil removal during precipitation and runoff. No vegetation should be required where the restored slopes are less than 5%.

4. Reclamation will notify local authorities prior to any major construction activity.

5. Truck travel within the construction area will be restricted to speed limits as regulated locally. To minimize disturbance, construction and staging areas will be marked so as to confine equipment to those areas. Adequate erosion controls must also be implemented.

6. Access to the construction site will be restricted and controlled. Public access to the haul roads may also be restricted, if warranted from a safety standpoint.

7. Traffic control will be utilized where necessary. Likely areas include the entrance to the Reclamation facilities at the intersection of Altube Avenue and Road 99W.

8. Reclamation will require the Contractor to obtain encroachment permits from Caltrans for any required traffic control operations. Reclamation will coordinate with Tehama County for use of any road(s) for hauling. Reclamation will notify the California Highway Patrol prior to initiation of hauling.

9. Dust abatement measures will be required and implemented, including watering dirt roads, exposed areas, and soil piles, and covering soil piles in staging areas if piles in staging areas will be worked in the short-term.

10. The contractor will be required to comply with applicable Occupational Safety and Health Administration guidelines. All construction equipment will be required to use properly maintained, factory equipped sound suppression equipment such as mufflers.

11. Although the greatest potential impact during construction will take place during the installation of the sheet pile, the hydraulic isolation that will result after its installation will prevent any further disturbance of the river. In addition, the Contractor would be required to comply with applicable Federal, State, and local laws, orders, regulations, and water quality standards concerning the control and abatement of water pollutants.

Additionally, the Contractor's construction activities would be performed by methods that would prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants into streams, whether flowing or dry watercourses. Precautions shall be taken to prevent excavated material from being washed away by high water or storm runoff.

The Contractor's methods of dewatering, unwatering, excavating or stockpiling of earth and rock materials would include appropriate measures to control siltation. Wastewater from general construction activities, such as drainwater collection, drilling, grouting, or other construction operations, would not be permitted to enter watercourses without the use of approved turbidity control methods. These methods may include, but are not restricted to: interception ditches, settling ponds, gravel-filter entrapment dikes, flocculating processes, recirculation, or combinations thereof.

12. If oak trees of any species are found on the project site, they will be protected if at all possible. If removal is unavoidable, Tehama County will be contacted. Any restrictions they may have on oak tree removal, will be incorporated into the specifications.

13. Other vegetation on site, which creates riparian habitat, or serves to control erosion, will be preserved to the extent possible. All land surfaces having vegetative removal will be suitably replanted to prevent subsequent erosion.

14. If any suspected cultural resources are encountered during construction, all work in the area of the find will be halted until it is evaluated by the Regional archeologist or his designated representative, and the State Historic preservation officer has been consulted (36 CFR 800.11).

15. Additionally, during the construction phase for the PPP, the fish screens for the temporary pumps will be removed prior to cofferdam construction, beginning in mid-March or early April 1994, and will remain out through late summer. They will be replaced prior to pumping for the TCC canal, scheduled to resume on September 15, 1994. It is anticipated that pumping may occur during the gates-up portion of this time period, as necessary, to meet water delivery needs.

16. Biological evaluation studies as listed in Appendix F will be implemented.

APPENDIX B

RESPONSES TO COMMENT LETTERS RECEIVED ON THE DRAFT ENVIRONMENTAL ASSESSMENT

First Public Comment Period: November 6, 1992 - November 27, 1992


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Comment Letters and Response

First Public Comment Period: November 6, 1992 - November 27, 1992

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# Taxpayers for Salmon Preservation

100 Main Street • Red Bluff, California 96060 • (916) 527-6220

November 25, 1992

Mr. Roger Patterson  
Regional Director  
United States Dept. of the Interior  
Bureau of Reclamation  
Mid-Pacific Regional Office  
2800 Cottage Way  
Sacramento, CA 95825-1898

DELIVERED VIA FACSIMILE

Dear Sir:

I am writing to express considerable concern with the Bureau of Reclamation's plans to construct and operate the so called "Pilot Pumping Plant" and the permanent "Archimedes Screw Pump" facility at the Red Bluff Diversion Dam. I am writing on behalf of the Taxpayers for Salmon Preservation, as well as the Red Bluff/Tehama County Chamber of Commerce.

The primary concern of both groups is the continued viability of all Salmon runs in the Sacramento River. It seems quite clear that 1.) several options are available for improving fish passage immediately and 2.) recent improvements for fish passage at the Red Bluff Diversion Dam have not been properly evaluated and/or reported.

We are deeply troubled that the huge amount of money allocated to installing the "Pilot Pumping Plant" and ultimately the permanent pumping plant is not being expended directly on salmon habitat or other mitigating measures, but on another gigantic construction project in and around the Sacramento River, certainly impacting the chinook salmon. In that, the Environmental Assessment (draft) is grossly inadequate as an environmental impact study, both during construction and operation phases.

I was recently in attendance at a meeting between the Bureau and the Tehama Colusa Canal Authority and the U.S. Fish & Wildlife Service. Surprisingly, unanimous agreement existed that predation was the number one impacting factor on salmon at the Red Bluff Diversion Dam. Equally surprising was the Bureau of Reclamation's refusal to conduct current predation studies, given new operating procedures (including "gates up" operations at least four months of the year) which could shed considerable light on the impact predation currently has on juvenile salmon. Further, the E.A. (draft) does not adequately address the probable predation associated with the "Pilot Pumping Plant" in and around screening areas, louvered areas, juvenile return bypasses or within pre-canal areas (i.e. desilting basins).

B-1

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C-065803

Naturally, these concerns are magnified when considering the permanent archimedes screw pumps..

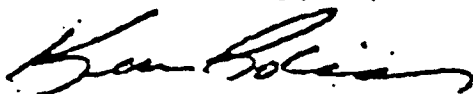
There is also reason to suspect the Bureau's level of sincerity in installing the "Pilot Pumping Plant" for purposes of real biological evaluation. It seems very unlikely that the Bureau of Reclamation currently believes that any real analysis of the "Pilot Pumping Plant" would or could take place between October 1993 (projected operational date) and February 1994 (scheduled decision to be made on the Red Bluff Diversion Dam Permanent "fix").

We are currently urging the following, non-exclusive, list of actions:

1. Alter existing fish ladders to make them more accessible/ attractive to upstream migrants.
2. Evaluate the effect of "gates up" operations on scawfish populations and ultimate juvenile salmon impact.
3. Evaluate the effectiveness of new juvenile bypass facilities and any other recent improvements in decreasing predation.
4. Install an accurate adult winter-run counting system (possibly sonar) to evaluate the true status of the species.
5. Generally reference, develop and report more current data from Red Bluff Diversion Dam operations as well as other comparable dam operations.

Because there are some very intelligent people around concerned about the fate of the salmon, and also concerned about the Bureau's modus operandi, there are doubtless other, cost effective and species effective, structural and/or operational alterations that could be very effective at the Red Bluff Diversion Dam. We would urge the Bureau to actively pursue any realistic, reasonable and short range programs designed to preserve the salmon in the Sacramento River.

Most Sincerely;



Ken Robison  
Co-Chair

cc: John Koeberer  
Jack Taylor  
Carol Sakamoto

B-2

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C-065804



Response to Comments Made By  
Taxpayers for Salmon Preservation  
Letter dated November 25, 1992

Comment #1

The draft Environmental Assessment (EA) addresses only the proposed pilot pumping plant. If built as planned, it may provide not only biological information but engineering and technical data as well. This data is independent and distinct from data that will be forthcoming from additional studies currently being conducted or planned as part of the long term fish passage study. Depending on the outcome of the project and the information obtained from it, the Bureau of Reclamation (Reclamation) may elect to utilize the pilot pumping plant in its entirety, or parts of it, for the long term fish passage program.

Reference was also made in your letter to several options and improvements such as altering the fish ladders, or installing fish counting systems that have not been properly evaluated and reported. Your comments alluded to the need to pursue these or any other programs to preserve salmon. We appreciate your comments and believe a number of these activities to be part of the long-term study currently underway, and thus outside the scope of this EA.

Comment #2

The pilot pumping plant is proposed to be a temporary test facility. The assumption that it is a permanent facility is incorrect. Fish passage at the RBDD has been identified as a major problem. We expect that the PPP will result in benefits that more than offset initial costs involved and will demonstrate the validity of the use of a pumping plant to solve the long term fish passage problem.

Comments also included a statement that the EA was inadequate as an environmental impact study. Reclamation, in keeping with the National Environmental Policy Act of 1969, has determined that an EA is the appropriate document for the proposed action. Additionally, the EA covers only the stated project as proposed, and is not intended to take the place of an environmental impact study which may be required for other actions such as those proposed for the Red Bluff Fish Passage Study.

Comment #3

The EA does not, as pointed out in your letter, include predation studies. Such studies are still being developed or are in various stages of evaluation at this time. Reference was made in the draft EA to a proposed biological evaluation study. This paper discusses some of the concerns raised and portions of it include assessments to be made of the predation problem, immediately downstream of the dam.



soon as possible. The EA should include a brief ~~mention of operational~~ flexibility of the gates and those aspects of construction scheduling which will minimize impacts to upstream passage.

3. The text (page 20, top of page) states that the Bureau of Reclamation is committed to minimizing salmon mortality "...to the extent practicable...." by correcting design or operational problems. Similar language should be included at the top of the Environmental Commitment List (Appendix A).

4. In the summary of benefits (page 17, Table 6), the assumed periods of increased gates-up operation for both the no-action and preferred alternatives should be explicitly stated. We understand this new gates-up period is expected to extend from mid-September to mid-May.

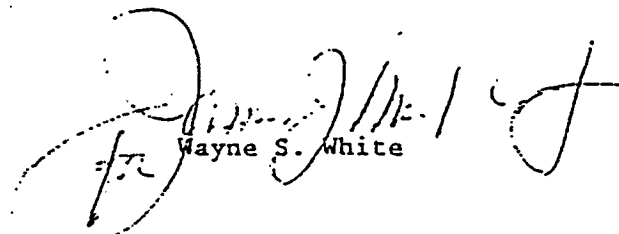
5. The summary should stage the importance of pilot facility evaluations towards the implementation of a long-term solution, as a full-scale pumping plant is one of several alternatives under consideration. Similarly, the text should be slightly modified as follows to reflect this purpose:

Page 20, paragraph 2: Change "...evaluation of this type of facility as a long-term solution...." to read, "evaluation of the potential for a larger facility of this type as a long-term solution, such as described in the Red Bluff Diversion Dam Fish Passage Program Appraisal Report."

Page 20, paragraph 3: Change "...the project might enter a second phase in which it would be used as a long-term, non-experimental conveyance facility." to read, "...the project might enter a second phase in which it would be used as a conveyance facility to provide interim benefits to fish and water users, until the preferred long-term solution is constructed."

Thank you again for inviting our continued participation in the planning of this project, and for your attention to our concerns. We look forward to working with you towards a timely completion of construction and initiation of the biological and physical evaluations of the pilot plant in the near future.

Our response has been coordinated with the Fish and Wildlife Service's Northern Central Valley Fishery Resource Office in Red Bluff. If you have any questions, please contact Steve Schoenberg or Tom Richardson in Sacramento at (916) 978-4613 or Jim Smith in Red Bluff at (916) 527-3043.

  
Wayne S. White

cc: ARD, FWE, Portland, OR  
Project Leader, NCVFRO, Red Bluff, CA  
NMFS, Santa Rosa  
USBR, Willows (Attn: Richard Kristoff)

CDFG - Inland Fisheries Division, Sacramento (Attn: Tim Farley)  
CDFG - Region 1, Redding (Attn: John Hayes)  
CDFG - Region 1, Red Bluff (Attn: Randy Benthin)  
USBR, Denver, CO (Attn: Charles Liston)

B-6

C - 0 6 5 8 0 8

C-065808

Responses to Comments Made By  
U.S. Fish and Wildlife Service  
Letter Dated November 25, 1992

Comment #1

Drawings that are finalized will be included in the Final Environmental Assessment. Those subject to change will be provided later.

Comment #2

Reclamation has the ability to accomodate masking flows at Gate 11. However, redirecting flows can be done only with approval from the Denver office of the Bureau of Reclamation.

Comment #3

Change made as requested.

Comment #4

Clarification made as requested.

Comment #5

Changes made as requested with the exception of slight modification. The word "interim" and the words, "...until the preferred long-term solution is constructed" have been deleted.



# SACRAMENTO RIVER COUNCIL

P.O. Box 992450, Redding, CA 96099-2450 (916) 244-3049

Redding, CA 96001; 916/244-0817, fax 0831

250 Overhill Dr.

November 27, 1992

SENT BY FAX & MAIL

Mr. Roger Patterson  
Mid-Pacific Regional Director  
U.S. Bureau of Reclamation  
2800 Cottage Way  
Sacramento, California 95825

Dear Mr. Patterson:

This letter transmits the comments of the Sacramento River Council on the bureau's draft environmental assessment of the Red Bluff diversion dam pilot pumping plant program. We continue to strongly support the only acceptable alternative for fish passage at Red Bluff diversion dam -- the full-size pumping plant. Consequently, we also strongly support the pilot pumping plant program.

Our greatest concern with the EA is the estimated start date for operation of the pilot project. Given the ongoing deleterious impacts of dam operations on the salmon fishery and the requirements of Public Law 102-575 (H.R. 429), we recommend this project be "fast tracked" to move the start date up as far as possible from October, 1993. This would also help to accelerate completion of the final project before the current target date of 1998. At that rate, the first outmigrating salmon to benefit from the project would not return to spawn until 2001! As Congressman Vic Fazio asked in reference to the full project, "What opportunities exist for shortening the construction schedule?"

The summary on page 2 of the document states that "Without implementation of this program ... a further decline in (the winter run) may occur and recovery may be inhibited." We suggest stronger language, such as "Without implementation of this program ... a further decline and extinction of the winter run is almost certain to occur." One need only look at the synchronization between the decline of the winter run and the start of Red Bluff dam operations to judge how much longer the species can survive with the gates down.

On page 10, we are glad you recognize that "The construction of the pilot pumping plant would allow Reclamation to meet (the) ESA requirements while still allowing the basic project purpose to proceed." After the bureau successfully completes the pilot project and commits to providing pumping power at project cost, we are sure our friends who are served by the Tehama-Colusa and Corning canals will also support the full project.

We were also pleased to read on page 26 of the EA that the bureau recognizes that "... RBDD reduced the opportunity for recreational fishing in the Sacramento River at (Lake Red Bluff) and further upstream."

There are those in Red Bluff who seem to have forgotten the \$4 million that salmon fishing brought annually into Tehama County not long ago, far more in the estimation of regional tourism experts than is brought in by Lake Red Bluff. Fortunately, this income can be brought back to Tehama County along with the salmon after we fix Red Bluff dam, as well as the Delta pumps and the temperature problems in the spawning stretch.

On this last issue, we appreciate your forthrightness in admitting that the water temperatures created by CVP operations at Red Bluff "violate State water quality standards or objectives." For this reason we cannot agree with the preceding statement on page 26 that "The water quality of the Sacramento River at RBDD is good." As pointed out on page 5 of the Fish and Wildlife Service's cogent comments on the draft EA, however, "Elimination of Lake Red Bluff is expected to result in as much as 1.0 degree Fahrenheit cooler water in the river within the lake reach and downstream of Red Bluff Diversion Dam, and may provide some additional temperature protection (and habitat) for salmon spawning in and below the lake reach." This would be a positive development indeed as it would allow the bureau to deliver more water to CVP contractors while still meeting the legally required basin plan temperature standard from April 15 through November at Red Bluff diversion dam.

We request a written response to these comments. Thank you for taking our views into consideration as you move rapidly forward with this desperately needed project. For further information please contact our consultant, Tryg Sletteland as shown beneath our letterhead.

Sincerely,



DONALD M. DEMSHER  
President and Chairman of the Board

cc: Congressmen Vic Fazio and George Miller  
Tony Azevedo, Tehama-Colusa Canal Authority  
Winnifred Jones, Corning Water District  
John Reginato, Shasta Cascade regional tourism consultant  
Chuck DeJournette, Sacramento River Council/Tehama Flyfishers  
Shel Meyer, NorCal Guides and Sportsmen's Assn./CV Fisheries Coalition  
Zeke Grader, Pacific Coast Federation of Fishermen's Assns.  
John Merz, Sacramento River Preservation Trust  
Jud Ellinwood, CA Salmon, Steelhead & Trout Restoration Federation.

P.S. When you respond to our comments, please also explain why a representative of the Sacramento River Council was not invited to the upcoming small group meeting to evaluate alternatives. As a very active leader of the campaign for the pumping plant over the past several years, we are curious why SRC was excluded from the negotiations. We are also concerned about the inclusion of Bob Bosworth, who represents neither the people of Shasta County nor any other organized interest in this matter. Given these and other considerations, the cost of a three day, consultant-led "process" which attempts to reach complete consensus on an acceptable alternative may not be justified.

Response to Comments Made By  
Sacramento River Council  
Letter Dated November 27, 1992

Comment #1

Comment concerned "fast-tracking" the project in order to accelerate completion of the final project. Reclamation has established a very ambitious schedule with first consideration being operations to begin in time for the winter-run for fall/winter of 1994. Reclamation would like to assure you that every opportunity to shorten the planning and construction process has been taken, and will continue to be taken as the project progresses.

Comments #2 and #3

We have noted your additional comments and suggestions for the final Environmental Assessment (FEA) concerning the addition of stronger language regarding decline of the winter-run and water quality (i.e., water temperature at Red Bluff). Reclamation has reviewed and considered your suggestions and concurs with your comment that the water could become cooler. We have made wording changes to reflect the spirit of your comment but did not quote you verbatim.

Comment #4

Regarding your mention of the small group facilitated meetings on the Red Bluff Fish Passage Program, attached is the report on the meetings which was prepared and issued by the neutral facilitator, CDR Associates. The report summarizes the discussions and the outcome of the meetings. As explained in the summary, Reclamation's aim was to include representatives of various interest groups in the discussions. The participating groups were:

Nat Bingham	Pacific Coast Federation of Fisherman's Association
Robert Bosworth	Former member, Shasta Co. Board of Supervisors
Jack Campbell	Tehama-Colusa Canal Authority
Robert Clark	Glenn-Colusa Irrigation District
Jud Ellinwood	California Salmon Steelhead & Trout Restoration Federation
Bill Gaines	California Waterfowl Association
Winifred Jones	Tehama-Colusa Canal Authority
Jo Ann Landingham	Tehama-County Supervisor
John Merz	Sacramento River Preservation Trust
Shel Meyer	Norcal Fishing Guides & Sportsman Association
Dick Pool	United Anglers of California
John Stouffer	Tehama County Planning Department
Bill Treat	Red Bluff-Tehama County Chamber of Commerce
Ron Vickery	Tehama-Colusa Canal Water Users Association
John Yingling	Red Bluff-Tehama County Chamber of Commerce

We believe the interests of the Sacramento River Council (SRC) were represented as evidenced by the report. Further, the SRC and the public at large will have opportunities in the future to discuss the information and issues exchanged in the December meetings. These opportunities will be part of the public involvement program currently being drafted for the next phase of work on the Red Bluff Fish Passage Program.



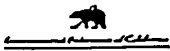


NOVEMBER 27, 1992

DEAR DAN,

THE TRUST WOULD LIKE TO MAKE THE FOLLOWING COMMENTS ON THE BUREAU OF RECLAMATION'S (BUREAU) DRAFT ENVIRONMENTAL ASSESSMENT (DEA) FOR THE PILOT PUMPING PLANT (PPP) AT RED BLUFF DIVERSION DAM (RBDD):

- 1) ON PAGE 19, REFERENCE IS MADE UNDER THE PPP ALTERNATIVE TO THE "CONTINUED OPERATION OF FIVE CONVENTIONAL PUMPS WITH SCREENED INTAKES (125 CFS TOTAL CAPACITY)." WE WOULD APPRECIATE KNOWING MORE DETAIL ABOUT THESE PUMPS, INCLUDING, BUT NOT NECESSARILY LIMITED TO, THEIR HISTORY (WHEN INSTALLED AND WHY), LOCATION. (FIGURE 1 IN THE EA DOESN'T HELP) AND HOW THEIR EFFECTS ON THE FISHERY ARE BEING MONITORED;
- 2) WE WOULD APPRECIATE A COPY OF THE STUDY FOOTNOTED ON PAGE 20 AND SUGGEST THAT IT BE INCLUDED AS AN APPENDIX IN THE FINAL EA;
- 3) THE DISCUSSION OF ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY (PG. 20)



P.O. Box 5366, Chico, CA 95927  
(916) 345-4050



IS VERY UNCLEAR TO US. MORE DETAILS WOULD BE APPRECIATED (A PARAGRAPH PER ALTERNATIVE; PERHAPS, OR MAYBE SOME FORM OF A GRAPH?);

4) UNDER "VEGETATION AND WILDLIFE" (PGS. 24-25), THE BUREAU'S COMMITMENT TO BOTH PAST MITIGATION REQUIREMENTS (REPLACEMENT OF ELDERBERRY SHRUBS) AND ANTICIPATED IMPACTS (PLEASE SEE THE LAST TWO PARAGRAPHS ON PAGE 25, WITH PARTICULAR ATTENTION ON THE USE OF THE WORD "SHOULD" IN THE LAST PARAGRAPH) LEAVES A LOT TO BE DESIRED. PLEASE INDICATE WHERE THE MITIGATIONS WILL OCCUR, THEIR EXTENT AND NATURE AND WHEN THEY WILL TAKE PLACE;

5) ON THE TOP OF PAGE 30 (FIRST PARAGRAPH), THE DEA STATES THAT "THERE WOULD BE NO SIGNIFICANT DIFFERENCE IN WATER DELIVERY BETWEEN THE PROPOSED ALTERNATIVE AND THE NO ACTION ALTERNATIVE. PLEASE PROVIDE THE DATA TO SUBSTANTIATE THIS STATEMENT;

6) ALSO: ON PAGE 30 ("GROWTH INDUCING IMPACTS"), THE PRIMARY INTENT OF THE PPP IS "TO PROVIDE A MEANS FOR CONTINUING WATER DELIVERY TO THE TCC DURING AN EIGHT MONTH PERIOD OF GATES UP OPERATION", WITH NO MENTION OF THE POTENTIAL RESEARCH BENEFITS.

THE TRUST WAS OF THE UNDERSTANDING THAT



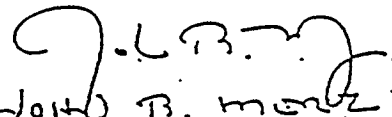
-3-

A BIGGER PICTURE WAS AT WORK HERE.  
PLEASE CLARIFY; AND,

7) UPON DISCUSSION OF THE SCOPING PROCESS  
(PAGE 31), IT IS STATED THAT THE DEA WAS  
ISSUED TO "... CONCERN PUBLICS IN OCTOBER,  
1992". THE POSTMARK ON OUR ENVELOPE READS  
NOVEMBER 6, 1992. A SOMEWHAT LONGER  
COMMENT PERIOD THE NEXT TIME AROUND  
WOULD BE APPRECIATED.

WE LOOK FORWARD TO YOUR RESPONSE TO OUR  
COMMENTS. PLEASE SEND ALL FUTURE CORRESPON-  
DENCE TO OUR LETTERHEAD ADDRESS.

SINCERELY,

  
JOHN B. MORZ

CHAIR, BOARD OF DIRECTORS

CC. U.S.FWS

PMFS

INTERESTED PARTIES



P.O. Box 5366, Chico, CA 95927  
(916) 345-4050



B-13

C-065815

C-065815

Response to Comments Made By  
Sacramento River Preservation Trust  
Letter dated November 27, 1992

Comment #1

The five conventional pumps currently in operation with a total capacity of 125 cubic feet per second were installed beginning in 1989 when three were put into operation. In 1990, an additional two pumps were added. The pumps were installed to permit water delivery during gates-up operation of RBDD. The design for the screens at the intake are currently underway. Installation must await completion of the PPP. Currently, there is no monitoring of the effects of the pumps. However, during operation, gates on the right side of the dam are closed to direct river flows and downstream migrating fish will be directed away from the pumps.

Comment #2

The copy of the proposed fish study has been sent to you as requested. However, as noted on the study, this is still a proposal. This or any other study will be made available at a later date only after it is finalized. Therefore, a copy will not be included as an attachment to the final Environmental Assessment (EA) as suggested.

Comment #3

The discussion concerning alternatives considered but eliminated, consisted of six additional proposals. The one proposal consisted of only a single helical pump. The remaining four proposals consisted of one helical pump and one archimedes screw pump, one helical and two archimedes screw pumps and so on; the last proposed combination consisting of one helical and six archimedes screw pumps. These alternatives included the existing pumps (125 cfs) to be operated in conjunction with the various combinations of helical and archimedes screw pumps.

The pumping capacity of each progressively greater number of archimedes screw pumps were then each capable of allowing a greater number of days during which RBDD can be operated with the gates up. The biological criteria alluded to in the DEA refers to the peak migration period of the winter-run passage that would occur during the year. When evaluated together with the number of days of gates-up operation; it was found that the number of additional fish that would benefit did increase. However, the PPP is not intended to be an optimal solution to the fish passage problem. Because the PPP is designed in part to resolve the uncertainty regarding this application of archimedes and helical pumps, additional investment in these pumps was determined to be inappropriate for the pilot study. Therefore, only the PPP alternative was selected for discussion and review in the DEA along with the no action alternative.

Comment #4

The discussion which appeared in the draft EA concerning replacement of elderberry shrubs was in reference to a past mitigation measure which was unsuccessful. It is for the purposes of discussion in this case that,

elderberry shrubs do not currently exist on the proposed site. However, Reclamation will attempt to correct this once construction activity ceases. Efforts will be made once again, to replace the shrubs from the previous, unrelated project. Depending on the final outcome of design and construction decisions and activities, we cannot at this time, commit to an exact location where replanting will take place or the date on which the shrubs will be in place. If so desired, Reclamation will keep you informed as these decisions are made and attempts at replanting take place.

Comment #5

Reference was made to a statement which appears at the top of page 30, first paragraph. "There would be no significant difference in water delivery" was made in reference to the no action alternative in comparison to operations currently in practice at RBDD. It was not made in reference to or in comparison with the preferred alternative. For purposes of clarification, this statement has been re-worded for the FEA to read, "Water delivery will remain unchanged from current operations at RBDD".

Comment #6

Comment regarding stated purpose of the PPP lacking reference to other potential research benefits is valid. Wording has been changed to reflect the concern raised. The only impact of the PPP is to provide an alternate means of diversion. This would allow existing CVP delivery to be maintained while extending gate-up operation of RBDD. No new development is proposed. The benefits to be accrued include additional biological and environmental information, as well as engineering and technical data that can be realized with the its installation and operation. Reference was made in the DEA to such benefits in the Summary of the document. Discussions were also included regarding biological studies and other data collection proposals throughout the DEA. The draft fish study which you requested is one such proposal.

Comment #7

The discrepancy in the date of the DEA and the cover letter used for distribution was noted. Reclamation would like to assure you that every possible means were used to expedite the distribution of the DEA for public comment. Every attempt was made to accomodate additional comments and final changes from participating agencies to arrive at as good a document as possible before public review.

Additionally, in accordance with the National Environmental Policy Act of 1969, a public comment period is not required for an EA. Due to the very ambitious schedule that Reclamation and the participating agencies are trying to adhere to, the public comment period of 3 weeks was judged to be more than adequate. At no time however, was elimination of a comment period considered. Reclamation and the other participating agencies made the decision earlier that public review and comment would be a necessary and integral part of the project.

B-15

## STATE WATER RESOURCES CONTROL BOARD

1000 PAUL R. BONDERSON BUILDING  
 900 STREET  
 SACRAMENTO, CA 95814

-(916) 657-1359

Facsimile (916) 657-1485

NOVEMBER 30 1992

Mr. Dan M. Fults  
 Acting Regional Director  
 U.S. Bureau of Reclamation  
 2800 Cottage Way  
 Sacramento, CA 95825-1898

Dear Mr. Fults:

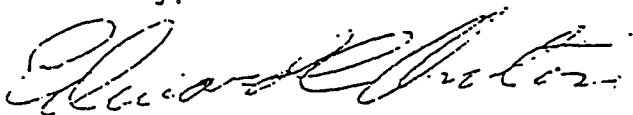
## RED BLUFF DIVERSION DAM PILOT PUMPING PROGRAM ENVIRONMENTAL ASSESSMENT

State Water Resources Control Board staff has reviewed the "Red Bluff Diversion Dam Pilot Pumping Plant Program Environmental Assessment" (EA). The purpose of the pilot program is to evaluate the performance of two types of pumps just downstream of the Red Bluff Diversion Dam (RBDD) so that the gates can remain open for an extended period, from mid-September through mid-May.

There are a number of apparent benefits to winter-run chinook salmon as well as other salmonids from this proposed pilot project. By opening the gates of the RBDD for an extended period, the various runs are allowed easier passage going up or downstream and predatory fish are not as likely to colonize the RBDD when the gates are open. In addition, elimination of Lake Red Bluff during these months will prevent the heating of the water within the lake reach and below RBDD by approximately 1.0 degree Fahrenheit. Entrainment of juvenile fish will probably be reduced by: the screening of the five existing 25 cfs pumps, the use of the two Archimedes screw pumps (which allow fish to pass through with minimal damage) and the bypass facility. As per California Department of Fish and Game's comments (letter to the U.S. Bureau of Reclamation, September 4, 1992), testing of the unscreened higher-speed helical centrifugal pump should be conducted when the winter-run juveniles are not present.

Staff has requested a copy of the proposed fisheries evaluation study component of the pilot program referenced on page 20 of the EA. If we have any further comments on the fisheries study we will send them to you in a timely manner. If you have any questions regarding our comments, please contact Ms. Heidi Bratovich at (916) 657-2214.

Sincerely,



Edward C. Anton, Chief  
 Division of Water Rights

Mailing Address:  
 DIVISION OF WATER RIGHTS  
 P.O. BOX 2000, Sacramento, CA 95812-2000



Classification	PRJ 3,000-
Project	CF
Control No.	92017904
Folder I.D.	5721
Keyword	project plan

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Response to Comments-Made-By  
State Water Resources Control Board  
Letter dated December 2, 1992

Comment

Reclamation has reviewed and considered your suggestions and concurs with your comment that the water could become cooler. At this time however, we will make minor wording changes but will not use the suggested language.

The five conventional pumps currently in operation with a total capacity of 125 cubic feet per second were installed beginning in 1989 when three were put into operation. In 1990, an additional two pumps were added. The pumps were installed to permit water delivery during gates-up operation of RBDD. The design for the screens at the intake are currently underway. Installation must await completion of the PPP. Currently, there is no monitoring of the effects of the pumps. However, during operation, gates on the right side of the dam are closed to direct river flows and downstream migrating fish will be directed away from the pumps.

The impact of helical pumps are uncertain but will be evaluated as part of this program. Impacts to fish will be minimized by monitoring at the evaluation facility and by implementing appropriate corrective measures, as necessary, through flexibility designed into the pilot pumping plant.

**Northern California Power Agency**

180 Kirby Way, Roseville California 95678

**MICHAEL W. McDONALD**

General Manager  
(916)781-4203

December 3, 1992

Mr. Dan M. Fults  
Assistant Regional Director  
U.S. Bureau of Reclamation  
2800 Cottage Way  
Sacramento, CA 95825-1898

**Subject:** Pilot Pumping Plant at Red Bluff Diversion Dam

Dear Mr. Fults:

Please accept these written comments on the Bureau's Environmental Assessment for the above subject. A copy of the assessment was forwarded to NCPA this week by the City Clerk in Redding, California. To the best of my knowledge, NCPA was not provided previously with a copy of the 11/4/92 Environmental document.

NCPA is pleased that the Bureau is continuing its program to protect endangered species affected by the CVP. However, we are very concerned that this energy intensive pumping option has not been evaluated for CVP electric power impacts. As you know, the Western Area Power Administration (Western) has contracts to sell the entire CVP power output, after allowance for project power loads, to non-profit federal preference entities in northern California. A significant new project load - such as a new Red Bluff Pumping Plant - would therefore increase Western's prices and reduce power availability. That lost federal power must then be made up by Western's customers.

For these reasons, we believe that the environmental assessment must clearly state the electric power requirements of the proposed pumping plant, and must then evaluate the environmental effects of that increased power usage. Although NCPA has not had sufficient time to review the assessment in detail, we note that an estimate of the Red Bluff Pumping Plant electrical load is not included. Nor does the environmental assessment make any attempt at evaluating the potential negative impacts of significant new loads at Red Bluff, including the potential need for new or expanded electric transmission lines to serve the pumping plant.

Thank you for the opportunity to comment on this subject. If you have any questions or comments on this letter, please contact me at the above phone number.

Sincerely,

*Roger A. Fontes* /KB

**ROGER A. FONTES**  
Assistant General Manager

RAF/kb

cc: Roger Patterson  
Dave Coleman  
Bob Clark (Glenn Colusa Irrigation District)

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Classif.	PRJ 300-
Project	GF
Contract	22018088
Funding	5721
Keyword	IEP



Responses to Comments Made By  
Northern California Power Agency  
Letter Dated December 7, 1992

Comment #1

Comment regarding Central Valley Project electric power impacts have been noted.

The Draft Environmental Assessment of November 4, 1992, you refer to, discusses the proposed Pilot Pumping Plant. The power needed to operate the proposed Pilot Pumping Plant, will be made available from existing sources.

Your additional comments pertain to a permanent pumping plant alternative which is one of several alternatives being studied as part of the Red Bluff Fish Passage Program. To date, a preferred alternative has not been selected. Power usage as well as other attendant issues will be addressed in a separate Environmental Impact Statement for all alternatives as applicable.

# COLUSA COUNTY WATER DISTRICT

Directors: Shirley Griffin • Kenneth Rominger • Gregory Ramos • H. Raymond Charter • Thomas Charter

November 17, 1992

Roger Patterson  
Regional Director  
U. S. Bureau of Reclamation  
2800 Cottage Way  
Sacramento, Ca. 95825

Re: MP750/ENV-4.00

Dear Mr. Patterson:

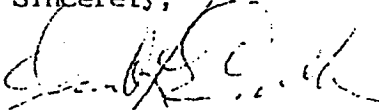
Thank you for a copy of the draft EA on the pilot pumping plant at Red Bluff and the opportunity to provide comments. All of the TC Canal users are, of necessity, intensely interested in this project and the results of the biologic data collected.

We would like to note that the project description is rather non specific, and would hope the final draft could include more information similar to that contained in the September 4, 1992 memorandum to you from the Fish and Wildlife Service relative to the data to be collected.

In less than two weeks from your transmittal of the draft we have been advised that some delays in pump manufacture could set back your completion date and possibly interfere with your environmental commitments found in the appendix.

We continue to support the pilot project and trust the information obtained will be valuable in appraising the long term solutions to fish passage difficulties at Red Bluff.

Sincerely,



Cloyd L. Emrick  
General Manager

CLE/smf

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Post Office Box 337, Arbuckle, California 95912 • (916) 476-2669 or (916) 476-2784

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Responses to Comments Made By  
Colusa Water District  
Letter Dated November 17, 1992

Comment

Comment regarding the Draft Environmental Assessment for the Red Bluff Diversion Dam Pilot Pumping Plant has been noted.

All changes as proposed in the September 4, 1992 memo from the Fish and Wildlife Service were addressed or has been incorporated into the Draft EA. This document was distributed for public comment in November of 1992.

APPENDIX C

U.S. FISH AND WILDLIFE SERVICE PLANNING AID MEMORANDUM



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Fish and Wildlife Enhancement  
Sacramento Field Office  
2800 Cottage Way, Room E-1803  
Sacramento, California 95825-1846

Memorandum

September 4, 1992

To: Regional Director, Bureau of Reclamation, Sacramento, CA  
Attn: Planning Division (Carol Sakamoto)

From: Field Supervisor, Fish and Wildlife Enhancement, Sacramento CA

Subject: USBR - Red Bluff Diversion Dam Fish Passage Study; Comments on a Draft Environmental Assessment for the Pilot Pumping Plant on the Sacramento River near Red Bluff Diversion Dam.

Thank you for providing us with the draft Environmental Assessment (EA) for the Pilot Pumping Plant. We are pleased that Reclamation has incorporated many of the suggestions provided in our earlier memorandum of March 18, 1992 and has taken the initiative to involve the Fish and Wildlife Service (Service) and other resource interests in the design phases of the project.

In preparing this Planning Aid Memorandum, the Service views the primary purpose of the facility to be an evaluation of the potential for pumps to replace gravity diversion. At the same time, the Service understands that the pumping alternative represents a promising yet unproven technology from the perspectives of both engineers and biologists. While our comments below represent a best professional opinion, we anticipate refinements in operational and design features of the plant during an initial evaluation phase, which will minimize fish losses.

Following these refinements, a further goal will be to evaluate the capability of pumps and associated structures to sustain operations over a period similar to full-time gates-up operation. During this second evaluation phase, the pilot plant will provide an interim water supply until the full-scale facility is constructed, which will extend the period for unimpeded upstream and downstream passage of salmonids. Continued biological monitoring will provide information over a wider range of river conditions, and assure minimum losses.

We also foresee a third phase of operations which would follow completion of the first and second evaluation phases, and provide interim fishery and water supply benefits prior to the funding and construction of a full-scale plant, if that alternative is selected. Although we look forward to full-time operation of the pilot facility, seeking these interim benefits should not conflict with the first objective to ascertain operational features which will reduce impacts to fish exposed to pumping to a level of insignificance.

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C-065825

## General Comments:

### 1. Siting of the Pilot Plant

Plant sites upstream and downstream of the dam have been considered. An upstream location would not interfere with the existing fish ladders, or with spawning gravels downstream of the dam, and would most easily be assimilated into a full-scale pilot plant. However, an upstream plant could only be tested with the dam gates raised, and would potentially limit the construction window, thus delaying completion of the pilot facility and selection of a preferred alternative. The downstream location could be operated year-round, and could be more easily linked to the existing bypass system. A downstream location would therefore hasten the evaluation process and selection of a preferred alternative for the long-term solution. This downstream location may potentially interfere somewhat with the attraction flows from the right bank fish ladder. This interference can be minimized by moving the facility downstream and giving careful attention to the contour of the sheetpiling. Judging from surface flows from the ladder, the new sheetpiling should not begin any closer than the edge of the existing sheetpiling, approximately 60 feet downstream from the ladder. The exact location of the structures will be fixed upon completion of an ongoing numerical study by Reclamation, and with agreement of the Service. The Service concurs with the downstream location for the pilot plant, but prefers an upstream site for a full-scale plant alternative.

### 2. Size of the Facility

The original basis of design contained two pumps, an Archimedes screw pump and a screw-impeller Hidrostal pump. Following resource agency input which included the Service, your revised plan calls for two Archimedes screw pumps and one Hidrostal, with an open bay for expansion. We support this revised plan, however, any further expansion at the downstream location beyond the four pump maximum would be discouraged, as we believe that this size is sufficient for testing purposes. Expansion of the pilot facility could interfere with spawning gravels downstream, and would conflict with the goal of a full-scale facility upstream of the dam, which would utilize the existing drum-screen and bypass complex.

### 3. Bypass system

An important consideration in the final design will be the bypass system. Among proposals which have been considered are: (1) A tie-in to one of the existing 60-inch pipes from the drum screens, (2) building a separate, but narrow diameter pipe to the present bypass outfall location, (3) inserting a small pipe inside one of the larger pipes, and (4) a separate pipe, but to a different bypass outfall location nearer to the bank. Construction of a separate bypass system to the same outfall location would require a coffer dam and excavation, and would be less cost-effective. A bypass nearer to the bank would be cost-effective, but unacceptable, because it is known from evaluation of the old bypass location that predators build up in this area. The idea of a small pipe inside the existing pipe was discarded because it was felt that

the additional surfaces could result in injury to fish when the larger pipes are needed during dam diversion.

At this time, the Service prefers utilizing one of the existing pipes. We emphasize that these larger pipes are intended to carry about 120 cubic feet per second (cfs) each in order to match the velocity of the river at the outfall and effectively disperse fish. When the dam gates are raised, and no diversion return flow is available, the test facility will provide for a 10 percent return flow of up to 36 cfs with all pumps running concurrently (i.e., total capacity of 358 cfs from the five 25 cfs existing pumps, two 100 cfs Archimedes pumps, and one 33 cfs Hidrostal pump), and as little as 3 cfs if only the Hidrostal is operated. With these low return flows, the fish will remain in the darkened pipe for a much longer time than for what the bypass is designed, and may be returned to the river disoriented or in poor condition. In addition, the lower flows would not efficiently disperse fish into the river and may result in attraction of predators to the bypass outfall.

To address these concerns, one potential solution is to flush the bypass pipe on a regular basis with a higher flow. This flow could be provided by intermittantly routing some of the screened water back to the bypass pipe to supplement the return flow through one of the 60 cfs bypasses from the existing drumscreens. Another option is to dedicate some of the 125 cfs from the five existing 25 cfs pumps which are proposed for water supply during gates-up operation, to continuously augment the bypass flow. It may also be possible to modify the bypass outfall to create a structural or high velocity barrier to predators without major in-river construction. We view these operational or structural changes as part of the initial evaluation process to assure minimum impacts to fish during long-term operations.

Operating criteria for the bypass system (flushing intervals, volumes) must be tested during initial evaluations and determined to be effective in minimizing fish impacts before long term gates-up operations would proceed. If adequate return flows are provided, a tie-in from the evaluation facility to the existing bypass should result in minimal impacts to fish.

#### 4. Trashrack

The trashrack should be designed to exclude large objects which could obstruct the screen and/or bypasses, and to maintain sweeping flows across the intakes. To achieve this function, we recommend a vertical, canted grid design, initially with 1-inch spacing to prevent adult salmon attracted to the lower end of the facility from being gilled on the rack. The design should include the capability to exchange the grid if necessary. Although it would be desirable to have a design which would also exclude fish, we do not consider this the primary function of the trashrack, and do not expect that fry <40 mm will be able to avoid the intake. Furthermore, we expect that at least one of the pump designs to have a negligible effect on fish mortality.

## 5. Screens

It is our understanding that the evaluation facility will have wedge-wire type screens. In our March 26, 1992 comments on the basis of design, we expressed some concern about potential difficulties with fouling and transport of debris with this configuration. With proper attention to the cleaning system, design of the trashrack, a safety system, and dimensions of the tie-in from the dewatering facility to the bypass, we no longer believe this will be a significant problem. The pipes from the evaluation facility to the bypass should be large enough to pass all objects not excluded by the trashrack.

Present plans illustrate an automatic sweeper to remove debris from the vertical screens. The California Fish and Game Code (Sections 1600, 5900, and 6100) requires continuous cleaning for screens designed for 0.33 feet per second, the maximum allowable through-screen velocity. Therefore, we recommend that a safety system be designed to shut off the pump to any screen in the event that the through-screen velocity exceeds 0.33 feet per second, which may be caused by excessive debris loading or sweeper malfunction. This could be accomplished by measuring the water height on both sides of the screen and activating an automatic shutoff feature when a prescribed head differential is exceeded. This would reduce the risks of either fish injury due to impingement on the screen, screen damage, or flooding out the facility.

In our previous comments of March 26, 1992, we also expressed concerns about entrainment effects of the higher-speed Hidrostal pump on fish swimming abilities. It will be necessary to operate this pump unscreened in order to document disorientation phenomena. Because of the lower performance of this pump in previous studies, Hidrostal testing should be limited from April 1 through June 30, when winter-run juveniles are not present. If this design proves ineffective, the pump should be idled or replaced with the Archimedes design, rather than have it fitted with a screen on the intake. An intake screen on the Hidrostal pump would probably interfere with the sweeping flows to adjacent screw pumps.

We have been informed by Richard Kristoff, Bureau of Reclamation, Willows that removable intake screens will be fitted to the five existing 25 cfs pumps. A brief mention of the placement and operation of these screens should be included in the EA.

## 6. Evaluation Facility

The height between drop pools must be designed in accordance with criteria developed by the National Marine Fisheries Service (NMFS) to avoid potential fish injury or stress; we do not anticipate any major modifications from the present design, which illustrates a maximum drop of about 7 feet.

## 7. Evaluation Criteria

The first evaluation phase should involve intermittent, short-term operation of both pump types. Refinements to the above design features should be made in this initial phase to minimize juvenile salmon impacts. The second phase should involve longer term, continuous operation of the pumps, to determine



pump durability, evaluate fouling problems, sedimentation and operations at different river flows. Biological monitoring will continue during the second phase. If during the first phase, one pump type demonstrates significant adverse impacts on fish survival or behavior which cannot be rectified, it should not be included in the second phase.

Fish passage through the existing bypass during gravity diversion will need to be evaluated with short-term operations, and compared with fish passage during pump diversion with the dam gates raised. Impacts in terms of quantified fish mortality, injury, condition, disorientation, predator activity near the sump, intakes and bypass outfall, or other measurable criteria shall be considered acceptable for long-term pilot plant operations if determined to be equal to or less than that observed for fish exposed to the drumscreens and bypass during gravity diversion. If adverse impacts are observed, efforts will be made to modify structures or operations to lessen these effects. In this way, long-term operations can be assured to have the least possible impact on fish.

#### 7. Temperature Benefits

Elimination of Lake Red Bluff is expected to result in as much as 1.0 degree Fahrenheit cooler water in the river within the lake reach and downstream of Red Bluff Diversion Dam, and may provide some additional temperature protection for salmon spawning in and below the lake reach.

#### Specific comments:

1. p. 1, ¶ 4. The NMFS Biological Opinion has defined gates-up operation from November 1 to April 30 as part of a reasonable and prudent alternative within the control of Reclamation. The benefit accrued by the pilot project is 2 additional months of gates-up operation, rather than 8 as implied.

2. p. 1, ¶ 4; p. 11, ¶ 2. The largest helical pump currently available has a maximum capacity of 33 cfs, not 100 cfs. The Service agrees that the larger Hidrostal unit would be desirable as it would match the capacity of the 3-flight Archimedes screw pump with the maximum variable speed setting of 28 revolutions per minute. Please contact the manufacturer and determine if a larger Hidrostal unit can be supplied by the anticipated completion date of October 1993.

3. p. 1, ¶ 4. "... (25 mm and smaller) ..." should read "... (25 mm and larger) ...."

4. p. 1, ¶ 4. The reference to the pumps being expected to have minimal impacts should be qualified by the understanding that impacts will be minimized by monitoring at the evaluation facility and implementing appropriate corrective measures as necessary. The summary should mention the flexibility designed into the pilot plant, such as pump speed control, exchangability of the trashrack, intake bell housings, vertical screens, operational flexibility of the bypass system and other features.

5. p. 1, ¶ 6. The main purpose of the pilot pumping plant is to assist in defining the preferred alternative. An ancillary benefit is augmentation of water supply. The pilot facility does provide some significant protection beyond that which would be mandated by NMFS under the authority of the Endangered Species Act, but we view this project as an essential step in achieving full protection, such as by replacing the dam with a full-scale pumping facility. The summary should reflect this purpose.

6. p. 6, ¶ 3. The pilot project was initiated by Richard Kristoff of the Bureau of Reclamation, not the Service, and the Archimedes screw application is credited to Carl McCullough, also of Reclamation, after seeing these pumps in Europe.

7. p. 12, ¶ 2. The phrase "...September through May," should read as on p. 13, ¶ 4 "mid-September through mid-May", or provide the specific dates.

8. p. 12, ¶ 3. The 149 day period of gates-up operation for the no-action alternative is incorrect as NMFS requires November 1 to April 30, or 180 days.

9. p. 12, ¶ 2. The phrasing "d. evaluation opportunity..." implies non-essential status to pump type selection. The first three items, a-c, are being evaluated with respect to pump type. Please rephrase.

10. p. 12, ¶ 4. The reference to the gates-down operation providing adequate water supply to users in "the town of Red Bluff" is unclear, as the water would be available independent of gate position. Do you mean water available for lake recreational use? Please clarify.

11. p. 13, ¶ 2. Please mention that the five conventional pumps will have screened intakes.

12. p. 13, ¶ 4. "(125 cfs)" should read "(125 cfs total capacity)."

13. p. 13, ¶ 4. "425 cfs would occur" should read "425 cfs would potentially be available." The value is 358 cfs if the Hidrostal is 33 cfs instead of 100 cfs.

14. p. 13, ¶ 5. The paragraph does not seem to accurately describe the most recent designs. The proposed location, as discussed earlier, will be specified on the basis of consultation with the Service and results of a numerical study in progress by Perry Johnson of Reclamation. The present plans do not convey fish via a single collector basin. Rather, there are three distinct separation and evaluation facilities for the pilot plant. The last sentence implies that the fish would enter the canal and somehow be diverted back to the river. The water first enters a separation facility where the fish are concentrated by a vertical screen and moved in the bypass flow to the evaluation facility. Most of the water (without fish), is conveyed to the canal. The bypasses flow through evaluation facilities where there is an inclined screen fish separator which moves fish into the holding tanks. When the bypass flow is not being sampled, the fish are conveyed not by the Tehama-Colusa Canal inlet works, but by separate 18-inch bypass pipes which will join one of the 60-inch main bypass pipes about 300 feet downstream

of the dam. Please update the description of the location and provide more detail on the main features of the plant.

15. p. 16, Table 2. The table does not appear to accurately summarize the literature cited. Please make the following changes for salmon life history attributes:

-Adult migration for fall-run peaks is in September while spring-run should read "peaks May-July" instead of "May, June, July".

-Spawning of late fall-run is January 1-April 15, of winter-run is April 16-August 15, and of spring-run is August 16-October 15.

-Winter-run egg incubation is April 15-October 15.

16. p. 20, Table 6. The five existing pumps should not be included in calculation of benefits of the pilot pumping plant, unless they are incorporated into the evaluation purpose of the project. Evaluation of entrainment by these pumps may be useful in determining effects of similar pumps elsewhere in the Central Valley, even though they are not considered potential candidates for use in a full-scale pumping plant. These pumps may be considered part of the project if used to augment return flow, as mentioned above. The purpose of these pumps should be clearly stated.

17. p. 21, Table 7. The "90% increase" in survival of winter-run has not been substantiated. We suggest the "90%" be deleted.

18. p. 22, ¶ 3. Please specify dates of gates-down operation.

19. p. 22, ¶ 3. The last sentence should be deleted. Attempting to increase the flow down these ladders would exceed their design specifications, and would not necessarily result in significantly greater attraction.

20. p. 23, ¶ 3. Change phrasing "Other listed species that occur..." to read "Other listed species that may occur...."

21. p. 24, ¶ 3. Change "Western pond turtle" to read "Northwestern pond turtle."

22. p. 24, ¶ 5. Change "...water oriented recreation..." to read "...lake oriented recreation...."

23. p. 25, ¶ 1. Change "...approximately eight months..." to read "...an additional 2 months...."

24. p. 25, ¶ 2. Change "...passage of the winter-run..." to read "...passage of most of the winter-run...."

25. p. 25, ¶ 2. Delete last sentence.

26. p. 26, ¶ 1. The last sentence refers to possible changes in lake water levels resulting from gates being closed to allow "...existing pumps to remain operational..." which would result in "changes in water quality downstream of RBDD." Please clarify the nature and severity of this impact.

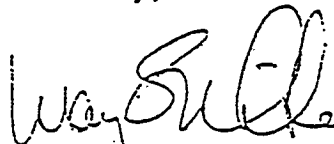
27. p. 26, ¶ 2. Delete second sentence.

28. p. 26, ¶ 3. Change "...National Park Service..." to read "...U.S. Forest Service...."

In summary, the Service supports the Pilot Pumping Plant as a project which offers the potential for substantial benefits to fish passage in the near and long term. Because it represents an untested technology, the facility must be fully evaluated and verified to have no significant adverse impact to fisheries before it can be committed to continuous operation. We look forward to full coordination with Reclamation in the evaluation activities.

Thank you again for inviting our input to the planning process. Our response has been coordinated with the Northern Central Valley Fishery Resource Office in Red Bluff. If you have any questions, please contact Steve Schoenberg or Tom Richardson in Sacramento at (916) 978-4613 or Jim Smith in Red Bluff at (916) 527-3043.

Sincerely,



Wayne S. White  
Field Supervisor

cc: Project Leader, NCVFRO, Red Bluff  
NMFS, Santa Rosa  
ARD, FWE, Portland OR  
Richard Kristoff, USBR, Willows  
Charles Liston, USBR, Denver CO

**APPENDIX D**  
**ENDANGERED SPECIES CORRESPONDENCE**

**C - 0 6 5 8 3 3**

C-065833



# United States Department of the Interior

TAKE  
PRIDE IN  
AMERICA

FISH AND WILDLIFE SERVICE  
Fish and Wildlife Enhancement  
Sacramento Field Office  
2800 Cottage Way, Room E-1803  
Sacramento, California 95825-1846

BUREAU OF RECLAMATION OFFICIAL FILE COPY RECEIVED		
AUG 23 1992		
CODE	AMOUNT	SERIAL & DATE
700		
750		August 25, 1992

In Reply Refer To:  
1-1-92-SP-1189

9/8/92

## Memorandum

To: Chief, Division of Planning and Technical Services, U.S. Bureau of Reclamation, Sacramento, California (Attn: Ms. Carol Sakamoto)

From: *Acting* Field Supervisor, Sacramento Field Office  
Sacramento, California (SFO)

Subject: Species List for the Proposed Red Bluff Diversion Dam Pumping Plant, Sacramento River, Tehama County, California

As requested by letter from your agency dated July 30, 1992, you will find attached a list of species designated as endangered or threatened under the Endangered Species Act of 1973, as amended (Act), that may be present in the subject project area (Attachment A). To the best of our knowledge, no species proposed for listing under the Act occur within the area. This list fulfills the requirement of the Fish and Wildlife Service to provide a species list pursuant to Section 7(c) of the Act.

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is also attached. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Attachment B for a discussion of the responsibilities Federal agencies have under Section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.

Section 7 consultation, pursuant to 50 CFR § 402, should be initiated if you determine that a listed species may be affected by the proposed project. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of this list with our office.

Also, for your consideration, we have included a list of the candidate species that may be present in the project area (See Attachment A). These species are currently being reviewed by our Service and are under consideration for possible listing as endangered or threatened. Candidate species have no protection under the Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

X to CVD F N 4 CO

Classification	PRT13 CO-
Project	CUP
Control No.	92013282
Refer ID	2380
Revised	DAM

C - 0 6 5 8 3 4

C-065834

Chief, Division of Planning and Technical Services

2

Please contact the Section 7 Coordinator of this office at (916) 978-4866 if you have any questions regarding the attached list or your responsibilities under the Act. For questions concerning the threatened winter-run chinook salmon, please contact Jim Lecky, Endangered Species Coordinator, National Marine Fisheries Service, Southwest Region, 501 West Ocean Boulevard, Suite 4200, Long Beach California 90802-4213, or call him at (301) 980-4015.

*Gail C. Kobetich*  
for Wayne S. White

Attachments

cc: FWS-SFO (Wetlands), Sacramento, CA

C - 0 6 5 8 3 5

C-065835

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED  
PILOT PUMPING PLANT AT RED BLUFF DIVERSION DAM -  
SACRAMENTO RIVER, TEHAMA COUNTY, CALIFORNIA  
(1-1-92-SP-1189, August 25, 1992)

Listed Species

Fish

winter-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Birds

bald eagle, *Haliaeetus leucocephalus* (E)

Invertebrates

valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (T)

Proposed Species

None

Candidate Species

Fish

sacramento splittail, *Pogonichthys macrolepidotus* (2)  
green sturgeon, *Acipenser medirostris* (2R)

Amphibians

california red-legged frog, *Rana aurora draytonii* (1#)

Reptiles

northwestern pond turtle, *Glemmys marmorata marmorata* (2)

Mammals

pacific western big-eared bat, *Plecotus townsendii townsendii* (2)

Plants

silky cryptantha, *Cryptantha crinita* (2)  
adobe lily, *Fritillaria pluriflora*

- (E)--Endangered (T)--Threatened (P)--Proposed (CH)--Critical Habitat  
(1)--Category 1: Taxa for which the Fish and Wildlife Service has sufficient  
biological information to support a proposal to list as endangered or  
threatened.  
(2)--Category 2: Taxa for which existing information indicated may warrant  
listing, but for which substantial biological information to support a  
proposed rule is lacking  
(1R)--Recommended for Category 1 status  
(2R)--Recommended for Category 2 status  
(#)--Listing petitioned  
(\*)--Possibly extinct



## ATTACHMENT B

### FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) and (c)-OF THE ENDANGERED SPECIES ACT

#### SECTION 7(a) Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; 2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species; and 3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

#### SECTION 7(c) Biological Assessment--Major Construction Activity<sup>1</sup>

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action<sup>2</sup> on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirements; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

---

<sup>1</sup>A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)C).

<sup>2</sup>"Effects of the action" refers to the direct and indirect effects on an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.

**APPENDIX E**

**OPTIONS TO INCREASE SWEEPING FLOW**

**C - 0 6 5 8 3 8**

C-065838

## APPENDIX E

### Options for Increasing Sweeping Flows Past the Red Bluff Pilot Pumping Plant Intake

The designers of the RBDD Pilot Pumping Plant (PPP) have identified the need to generate greater sweeping flows past the PPP facility. River channel work will take place following construction of the PPP. The designers initially recommended five possible courses of action to facilitate greater sweeping flows at the intake of the PPP. These options include:

- 1) gate manipulations at RBDD;
- 2) dredging of the site above and below RBDD, and;
- 3) use of groins or other channel control structures in the river;
- 4) constricting the channel cross section above the dam; and
- 5) a combination of the above.

Continued hydraulic model studies combined with comments from the first and second revised Draft EA review have led Reclamation to select a version of number 5) above as the channel modification option recommended for implementation. This option incorporates gate manipulation at RBDD with limited upstream dredging and has comparable flow manipulation benefits to the other channel modification options considered. Use of gate manipulation with limited dredging allows adjustment for specific river flows, bar deposition, or flow velocity objectives. Reclamation believes that the biological impact of this option is no more severe than the other options considered in that shear zones would be limited to one large separation. In addition, when at all possible, depending on river flow velocity and bar deposition, all gates will be maintained in a raised position. This option can also be achieved with minimum cost with no in-river construction (except dredging).

It is anticipated that depending on river discharge, the extent of sediment deposition, and the number of PPP pumps in operation; gates would be opened from the left and right banks with the center gates closed. Recommended gate operations will be determined through the continuing laboratory physical model investigation and through field flow and fisheries investigations. No more than 1.2 ft of differential would be generated across RBDD. With low river flows and substantial deposition; gates 1, 2, 10, and 11 would possibly be open with gates 3 through 9 closed. As river discharges increase or the required magnitude of sweeping flows decrease additional gates would be opened. It is expected that the fisheries agencies will be actively involved in the collection and review of hydraulic and biological data and the selection of recommended operations.

Use of gate manipulations (selective gate operation) can allow for periodic or short term modification of the flow pattern, if biological considerations permit, for stronger sweeping flows past the PPP inlet or for dispersion of predators below normally closed gates. On occasions, additional gates may need to be opened depending on river flow, especially during flooding conditions.

In addition to gate manipulations, limited upstream dredging will be required. The amount will depend upon the condition of the river and sediment load from

Red Bank Creek at the time. Since the river condition and sediment load are transient in nature, a worst-case situation such as existed prior to the February/March 1993 flooding, was considered for determining dredging quantity and location. Presently the river would require less dredging than is discussed below (estimate of dredging for current condition is less than 2,000 cubic yards).

Dredging would occur above gates 9, 10 and 11 and below Red Bank Creek. Based on the February, 1993 deposition, the maximum amount of material to be moved would be 5,000 cubic yards. The maximum dredging zone is somewhat pie shaped, with the arc side facing northeast, and is 200 feet long, 50 feet wide and up to 5 feet in depth. The material removed is to be relocated toward the center of the river, or removed and deposited in disposal ponds located adjacent to the Tehama-Colusa Canal, if necessary (See Figure A-1).

Temporary dikes and/or sediment control curtains will be used to control turbidity and sediment spread during dredging if necessary. River flow and velocity may be controlled somewhat by directing more flow to the east side of the river during dredging operations. Dredging would occur during the gates up time and when potential impact on salmon movement, spawning, and rearing is minimized. Input from the resources agencies indicate that a January through April 15 window for dredging activities would be desirable. No downstream dredging is anticipated in conjunction with gate manipulation. Future upstream dredging may be limited with selective gate operation used to control deposition, and may be repeated with a frequency that would offset any significant river sediment depositions.

The initial five alternatives are discussed as follows:

1.) Gate manipulations

Discussion:

Operation of the RBDD gates can be used to increase velocities adjacent to the RBPPP site. Gate use can be modified and thus adjusted to specific river and bar conditions. Indications are that the influence (both upstream and downstream of RBDD) of gate manipulation will be limited by bar characteristics. Depending on the bar, gate manipulation (that generates no more than the maximum allowable 1.2 ft differential) by itself may not generate the objective 1.0 to 4.0 ft/s sweeping velocities. Recommended gate operations which may include a recommendation not to use gate control will be selected through biological and hydraulic investigations.

Gate manipulation will generate a head differential at RBDD which may retard fish passage. Gates would be manipulated generating head differentials that are no greater than the current 1.2 ft criteria. Depending on operation, gate manipulation will also create a large slack water zone, mid-channel, downstream of the dam. Concentrated flows would pass RBDD near both banks (through gates 1, 2, 3, 9, 10, and 11). This flow distribution may generate increased predation.

Use of gate manipulation would allow for periodic or short term modification of flow fields. For example if biological considerations allowed; short term flow concentration that would generate stronger sediment sluicing flows at the RBPPP intake could be generated. Likewise period manipulation of all gates may be attempted to disperse predators.

#### Preliminary Assessment:

This alternative will allow for manipulation of gates at RBDD with no construction. With closure of specified gates, hydraulic conditions would be altered and flows through RBDD would be redirected towards the intake of the PPP. Greater flows at the intake will sweep fish past the intakes, ameliorate trash accumulation, and reduce sediment deposition.

Upstream fish passage should not be hindered by this activity. The closure of gates may result in the redirection of the downstream migration of juveniles and greater contact with the PPP facility. It is important to note that the PPP is designed to pass fish with minimal impact. Even though more fish may be redirected to the vicinity of the facility, resulting greater flows from this action should facilitate greater fish passage past the intakes.

A possible negative effect could be the creation of predator habitat behind gates that are lowered to generate the sweeping flows. Operators could intermittently schedule gates to be opened to retard possible predator buildup associated with gate manipulation. Any predator buildup at the intake would have to be dispersed. Biological monitoring and evaluation of the site will determine if predator removal is warranted.

#### 2.) Dredging of site above and below RBDD.

##### Discussion:

The existing sediment deposition, both above and below RBDD, is likely the single most important factor influencing RBPPP site hydraulics. Dredging of deposition from both above (possibly up to Red Bank Creek) and below the dam would substantially strengthen RBPPP sweeping flows. Required dredging frequency is uncertain but may be once or twice a year. The extent of required dredging will be identified through ongoing hydraulic investigations. (Figure A)

Options for dredging or deposition removal are as follows: 1) use of a hydraulic cutter head suction dredge that would be done from a barge above the dam when RBDD gates are down and the Lake Red Bluff pool is present, 2) use of a dragline or other bank based removal done when the river is at a low flow and with RBDD gates up or 3) possibly by displacing the bar material into the thalweg for river transport.

Dredging and deposition removal options will generate turbidity and transport of the fines. Redeposition of fines can adversely effect

incubating eggs and larval fish emergence. Turbidity control curtains may be used to partially contain generated turbidity. Curtains however are only effective in low velocity zones. Spawning activities below RBDD will be reviewed and deposition removal conducted during biologically acceptable windows.

#### Preliminary Assessment:

This option involves channel modification of areas located above and below RBDD. Possible modifications include partial or total removal of gravel deposits (above elevation 235) at the confluence of Red Bank Creek and Sacramento River. Options for deposition reduction include redistribution of bar material across the channel or dredged removal. Redistribution or dragline removal would be done during low water conditions to minimize water quality concerns associated with the dredging action. Hydraulic cutter head suction dredge removal of deposition above the dam would be conducted from a barge when Red Bluff Lake is pooled. Every effort will be made to schedule activities so that impacts on spawning adults, subsequent incubation period and fry emergence will be minimized.

Control berms or check dams will be constructed in the river to allow metering of suspended material as appropriate. Dredging activities will be monitored pursuant to state water quality requirements. No material will be removed from the river if redistribution is used. Gravel would be redistributed in the river to form proper channelization. Sediment disposal basins, constructed for use with the Tehama-Colusa Canal Settling Basin, could be used with options requiring sediment removal. There is a possibility that suspended material may impact spawning areas below the site. The impact of this action could be reduced if flushing flows are incorporated via gate manipulation or flood releases upstream. It is recognized that sediment deposition will occur in areas adjacent to the PPP and regular dredging will be required to maintain the facility.

- 3) Use of groins or other channel control structures in the river; and
- 4) Constricting the channel cross section above the dam.

#### Discussion:

Use of groins or other channel control structures - It is anticipated the groins could be used to maintain the thalweg on the right side of the channel through RBDD and past the RBPPP intake. The groins would be located primarily above RBDD and possibly also in the RBDD tailwater. The groins would establish channel cross section with submerged controls (sheet pile, rock fill, etc.) that would maintain a natural bend morphology with shallower channel to the left and the thalweg to the right. The structures could be designed to minimize flow separation and the creation of predator habitat. This design has the potential to aggressively sluice Red Bank Creek deposition and maintain a strong sweeping flow past

RBPPP. This option likewise would be developed through biological and hydraulic investigations. (Figure B)

Constricting channel cross section above the dam - The left bank of the river could be displaced towards the right bank thus constricting the river channel approaching the dam by displacing the left bank toward the right bank which would establish a stronger current past Red Bank Creek. The objective of this effort would be to degrade the Red Bank Creek bar and increase flow past the RBPPP intake. The channel constriction would extend from several hundred feet above Red Bank Creek to 100 to 200 ft above RBDD (Figure C). It appears that channel width would have to be reduced approximately 300 ft to a width of approximately 450 ft. The restricted channel would likely be benched at approximately elevation 240. The constricted channel would overtop starting at a river discharge of approximately 10,000 ft<sup>3</sup>/s and would be fully submerged when RBDD gates were down.

The channel constriction could be constructed with driven sheet pile, or riprap surfaced embankment fill. Depending on how the constriction was transitioned back to the left bank, a separation zone (that possibly could extend through and below RBDD) could result in deposition and establishment of predator habitat. It may be difficult with this structure to sustain a strong current through the dam and past the RBPPP intake.

For optimum effectiveness in sustaining sweeping flows, accessory use of submerged groins and/or limited dredging may be required. These additional structures would reduce future deposition and thus would reduce the need for future dredging or deposition removal. Additional right bank erosion protection between the headworks and Red Bank Creek may be required. The channel constricting structure would seal lower entrances to the left bank slough which may or may not be of biological concern. Care should be taken to assure that the structure does not adversely effect the performance of RBDD. This, and all other alternatives which involve construction or the movement of riverbed materials, would have to be scheduled to minimize biological impacts.

#### Preliminary Assessment for options 3 and 4:

These options involves the use of submerged controls (ie. sheet pile, rock fill) that will allow natural stream bed morphology to be maintained. This design will provide for sluicing the Red Bank Creek deposition and the generation of strong sweeping flows past the PPP. The potential sites for these structure would be above and/or below RBDD. The major biological consequences for this activity center around possible predator habitat established by the structure. Biological monitoring is required to ascertain the need of predator removal or redistribution.

## 5) Combination

### \* Combinations of the above -

Most likely, a combination of the options discussed above will yield the most effective option for providing needed sweeping flows. Additional study with the physical model, and continuing coordination with the resource agencies will be utilized to develop an alternative that provides the needed hydraulic characteristics with a minimal impact to fishery resources.

### Potential Impact on Salmonid and Riparian Habitat

Normally, there is very little fish spawning activity in the immediate vicinity of the RBDD and the PPP project site. Thus, the various alternatives that may be utilized to generate sweeping flows are not expected to have a significant impact on salmon spawning.

For riparian habitat, the immediate impact will be the removal of vegetation before construction begins. Other vegetation adjacent to the area would not be negatively impacted by greater sweeping flows, since the reach below the dam is historically subjected to great fluxuations in flow regimes due to seasonal changes which recur every year.

### Limitations of Study to Date

The initial alternatives for increasing sweeping flows that are presented in this document were developed through preliminary physical model investigations and consultation between Reclamation engineers and fisheries biologists. The conceptual details presented, the size and extent of deposition removal and the structures and their expected performance characteristics, and potential biological influences are all approximate. This document presents a general overview of the initial alternatives with associated biological and engineering concerns. Ongoing model studies combined with Draft EA review comments have led to selection of a recommended alternative. The alternative selected and its biological and physical influences will be field evaluated as part of the RBPPP evaluation. Any needed modifications as supported by ongoing field evaluations will be incorporated only after separate environmental documentation is provided.

### Additional Studies - Alternative Development and Field Verification

The recommended alternative and any subsequent alternatives that may become necessary will be evaluated and monitored for environmental and biological considerations before adoption/inclusion. The development of alternatives and their selection along with design, and field verification (with refinement) will be achieved by:



- \* Conducting detailed physical model investigations of the recommended alternatives.
- \* Initiating monitoring and documentation of the in-river fishery (this is a major task of the planning studies, supplemental data development, and pilot pumping plant evaluation as outlined in the Program Plan of Study for the Red Bluff Diversion Dam Fish Passage Program).
- \* Review of the available data and findings from the above studies by Reclamation and resource agencies.
- \* Implementation of the recommended alternative or selection of any subsequent alternative or sequence of alternatives to be pursued by Reclamation and the resource agencies, if the recommended alternative proves to be inadequate hydraulically or biologically.
- \* Development of a design by Reclamation.
- \* Construction.
- \* Field evaluation of the biological and physical impact of the flow modification and associated structures (included in the study scope as outlined in the Program Plan of Study for the Red Bluff Diversion Dam Fish Passage Program).
- \* Review of field data with alteration of flow modification and associated structures by Reclamation and resource agencies.

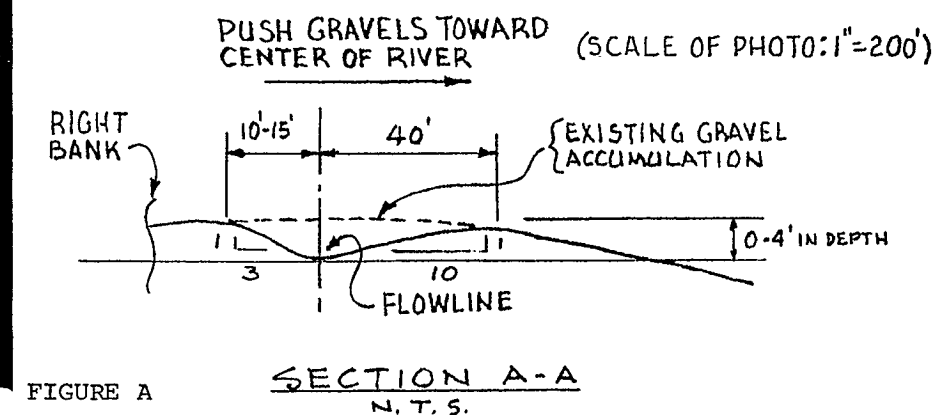
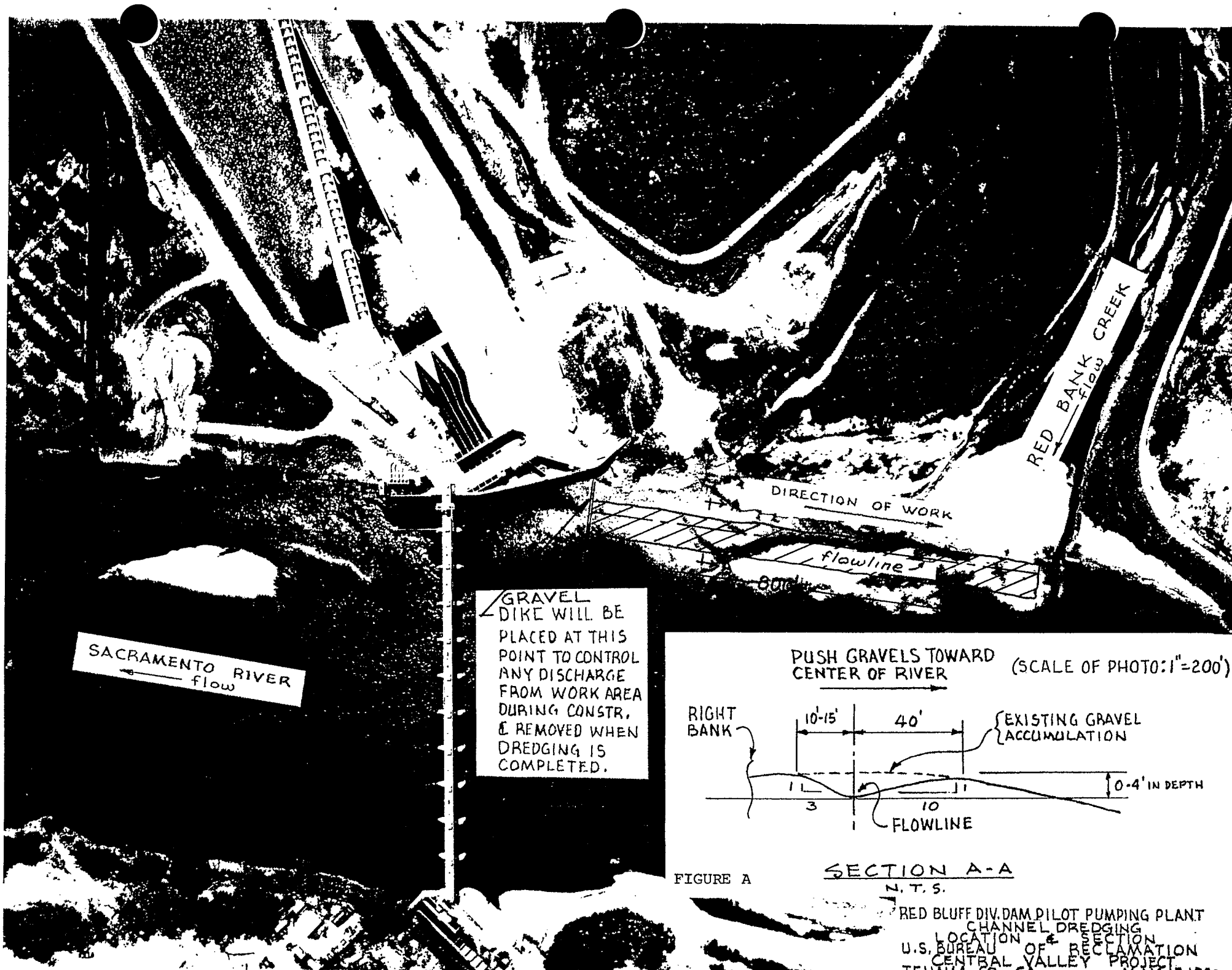


FIGURE A

RED BLUFF DIV. DAM PILOT PUMPING PLANT  
CHANNEL DREDGING  
LOCATION OF SECTION  
U.S. BUREAU OF RECLAMATION  
CENTRAL VALLEY PROJECT  
TEHAMA CO. CA  
MAY 13, 1993

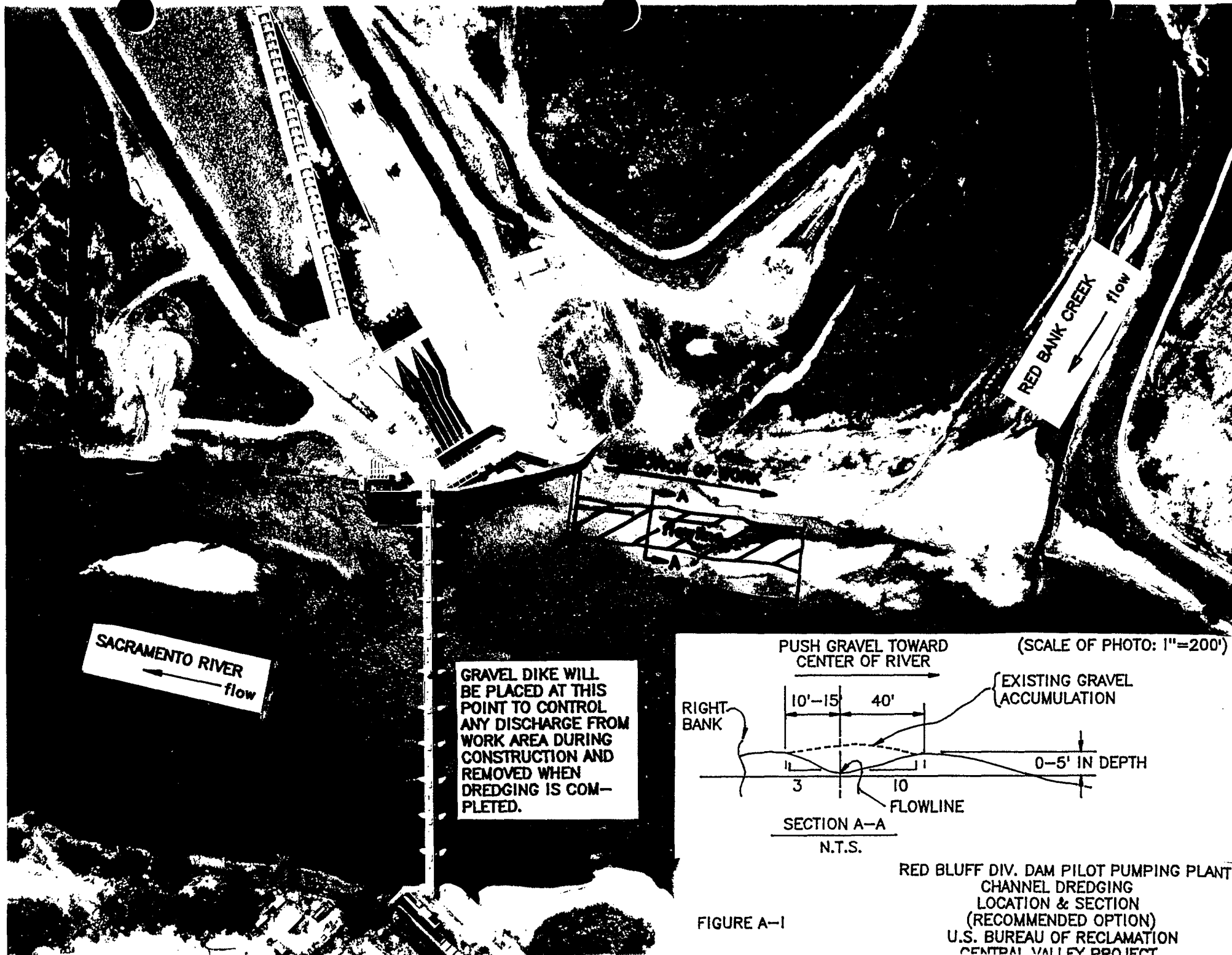
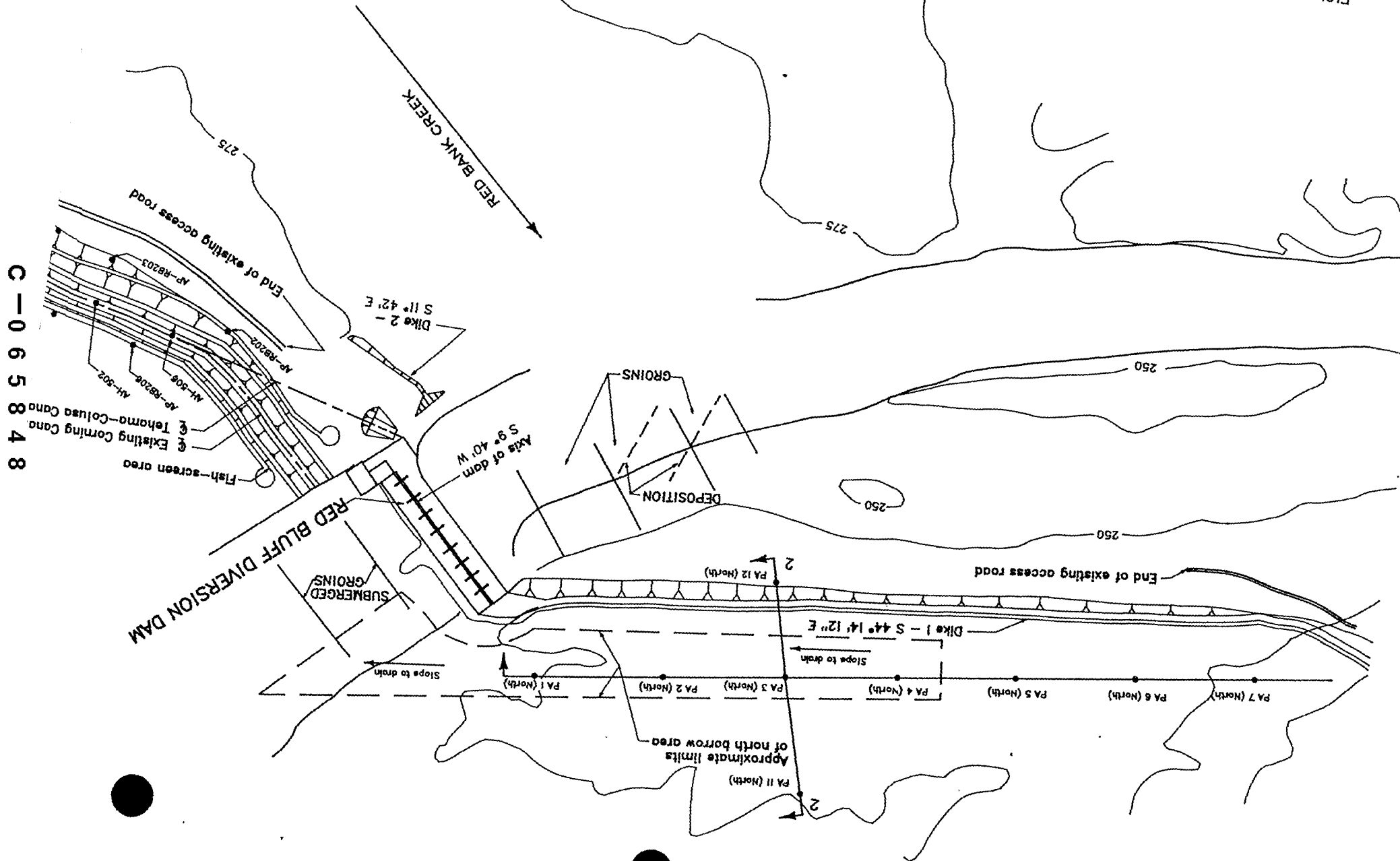


FIGURE A-1

FIGURE B  
POSSIBLE GROIN TREATMENT WITH ESTIMATED DEPOSITION



C-065848



APPENDIX F

RED BLUFF DIVERSION DAM PILOT PUMPING PLANT  
BIOLOGICAL STUDIES

RED BLUFF PILOT PUMPING PLANT BIOLOGICAL STUDIES \*

1993 -- 1998

GOALS AND OBJECTIVES - COMPILED BY C. LISTON

I. DETERMINE IF A MAJOR PUMPING PLANT AT RBDD CAN OPERATE WITH MINIMAL LOSS OR HARM OF DOWNSTREAM MIGRATING CHINOOK SALMON YOUNG

- A. Determine survivorship and potential injury to young salmon in the present bypass system at RBDD under differing conditions that reflect seasonal and flow rate changes.

Time Frame: May, 1993 - November, 1994

- B. Determine survivorship and potential injury to young salmon entrained into the Archimedes and screw-centrifugal pumps under differing conditions that reflect seasonal and flow rate changes.

Time Frame: January, 1995 - April, 1997

- C. Determine the efficiency of recovering young salmon in the holding tanks following introduction of fish directly into the pump effluents; if less than 100 % recovery, determine where fish are remaining in the system and recommend and implement improvements.

Time Frame: January, 1995 - March, 1996

- D. Determine survivorship and potential injury to young salmon exposed to the various structures of the fish evaluation facility including the immediate area receiving pump effluents, sluiceways, separation facilities with vertical angled screens, bypass channels upstream of the holding tanks, and the holding tanks, under differing conditions that reflect seasonal and flow rate changes.

Time Frame: January, 1995 - September, 1996

- E. Determine residence time, survivorship, and potential injury of young salmon in the bypass pipe leading from the fish evaluation facility to the bypass outlet in the Sacramento River under flow rates expected with normal use of the fish evaluation facility, and under "pulsed" flows proposed for transporting fish to the bypass outlet.

Time Frame: January, 1995 - September, 1996

- F. Determine movement and behavior of young salmon along trashracks, near openings to the pump barrels, and near the lower end of the Archimedes and screw centrifugal-type pumps using underwater video cameras and hydroacoustics.

Time Frame: November, 1994 - November, 1997

\* Biological study evaluations will be an adaptive management process which may lead to some modifications and changes as the studies progress. The studies are subject to funding availability.

- G. Determine predator-prey interactions between young salmon and Sacramento squawfish following passage of young salmon through the Archimedes and internal screw centrifugal pumps.

Time Frame: January, 1996 - June, 1997.

- H. Develop an increased understanding of the timing and abundance of downstream migrating salmon in the Sacramento River near RBDD.

Time Frame: April, 1993 - February, 1998

- I. Estimate seasonal and annual numbers of downstream migrating salmon young entrained into the RBPPP pumps by sampling holding tanks; determine viability of fish sampled from the holding tanks; determine seasonal and annual percentage of young Sacramento River salmon entrained.

Time Frame: January, 1995 - December, 1998

- II. DETERMINE IF A MAJOR PUMPING PLANT AT RBDD CAN BE CONSTRUCTED AND OPERATED IN A MANNER THAT CREATES NO NEW ATTRACTION FOR FISH PREDATORS, AND, WHERE POSSIBLE, MINIMIZES FISH PREDATION NEAR STRUCTURES ASSOCIATED WITH THE PUMPING PLANT

Determine seasonal adult squawfish movements and behavior at RBPPP near RBDD through radiotracking techniques.

Time Frame: April, 1995 - May 1998

Determine seasonal relative numbers of predators near the trashracks and intake structure of RBPPP, and immediately below the bypass outlet in the Sacramento River; if predators increase through time, develop methods for removing or scattering predators.

Time Frame: March, 1994 - May, 1998

- L. Determine the extent of predator colonization inside the intake sump area of RBPPP; if predators are residing in this area, develop methods to remove all predators.

Time Frame: May, 1995 - November, 1998

(Note: to accomplish objectives K and L above, considerable electrofishing and possibly netting will be done in the Sacramento River; with this, other species such as green and white sturgeon, catfish and American shad will be sampled and studied for any potential negative interactions between RBPPP and these species; focus will be on "native" species)



III. DETERMINE IF A MAJOR PUMPING PLANT AT RBDD COULD BE OPERATED WITH NO DELETERIOUS EFFECTS ON UPSTREAM SPAWNING MIGRATIONS FOR THE FOUR RACES OF SALMON AND STEELHEAD TROUT IN THE SACRAMENTO RIVER AT RBDD

- M. Determine, through radiotracking, the seasonal and diel movement patterns of upstream migrating adult chinook salmon and steelhead trout near the operating RBPPP; if adult salmonid behavior is modified and upstream runs are negatively affected, provide recommendations for operational or structural changes at RBPPP.

Time Frame: January, 1995 - November, 1997

IV. DETERMINE IF AN EXPANDED PUMPING PLANT AT RBDD CAN BE OPERATED WITH NO HARM TO NATIVE SACRAMENTO RIVER FISH POPULATIONS FROM ENTRAINMENT OF LARVAE

- N. Determine annual entrainment levels of larval and post-larval fishes in the RBPPP pumps; assess if entrainment rates limit populations of native Sacramento River fishes.

Time Frame: February, 1996 - August, 1997

V. PROVIDE A COMPLETE RECORD OF ENVIRONMENTAL AND ENGINEERING DATA OF IMMEDIATE USE TO ALL RESEARCHERS FOR INTERPRETING BIOLOGICAL DATA

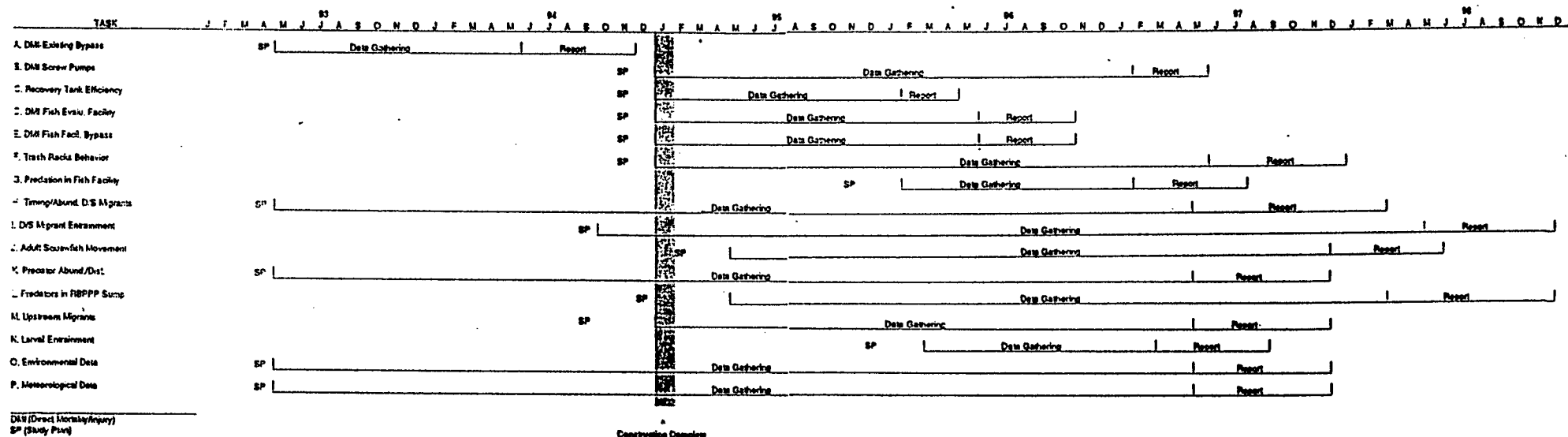
- O. Obtain and analyze records of frequent readings of water temperature, dissolved oxygen, pH, conductivity, turbidity, suspended sediments, river stage height, and river flow of the Sacramento River near the intake area of the RBPPP throughout the evaluation study; assure immediate access of data through computer technology to all RBPPP researchers.

Time Frame: May, 1994 - November, 1998

- P. Obtain a continuous record of local atmospheric conditions including precipitation, barometric pressure, wind patterns and cloud cover throughout the evaluation study; assure immediate access of data through computer technology to all RBPPP researchers.

Time Frame: May, 1994 - August, 1998.

RBPPP Biological Evaluation Tasks and Schedule



C-065854

APPENDIX G

RESPONSES TO COMMENT LETTERS RECEIVED ON THE DRAFT ENVIRONMENTAL ASSESSMENT

(Second Public Comment Period: June 21, 1993 - July 12, 1993)

INDEX for Appendix G

Comment Letters and Response

Second Public Comment Period: June 21, 1993 - July 12, 1993

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## DEPARTMENT OF FISH AND GAME

416 NINTH STREET  
P.O. BOX 944209  
SACRAMENTO, CA 94244-2090

(916) 653-4875



July 12, 1993

Mr. Roger Patterson, Regional Director  
U.S. Bureau of Reclamation  
2800 Cottage Way  
Sacramento, California 95825-1898

Dear Mr. Patterson:

Draft Environmental Assessment (Second Revision) for the  
Red Bluff Diversion Dam Pilot Pumping Plant

Thank you for the opportunity to review the subject document. The proposed project is for the construction of a pilot pumping plant at the base of the existing Red Bluff Diversion Dam. The facility will consist of two Archimedes screw pumps, one helical pump, and an open bay for the future installation of an additional pump. There will also be evaluation facilities incorporated into the project which will allow detailed biological and engineering studies of the pumps. Construction is scheduled to begin in April 1994 and will be completed by December of the same year. This project has been the subject of numerous meetings attended by our staff and is strongly supported by the Department.

The Environmental Assessment (EA) is generally accurate in describing the existing conditions at the site, the potential for impacts, and recommends appropriate mitigation measures for those identified impacts. The only area of concern we have is with the discussion of possible channel modifications for developing sweeping flows past the pumping plant intake. The lack of specificity regarding the precise mechanism for attaining sweeping flows is understandable because of the need to first construct the plant before a particular modification can be identified. The EA states that, depending on which channel modification(s) are needed, a separate EA may need to be prepared to address environmental impacts. We will be available to work with Reclamation's staff in this analysis and the selection of an alternative to achieve the sweeping flows with a minimum of additional impacts to the river or its associated fish and wildlife. We have reviewed the Reclamation's application for a Corp of Engineers' permit for the channel modifications and attach our permit review comments for your information.

G-1

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C-065857

Mr. Roger Patterson  
July 12, 1993  
Page Two

The EA discusses, under the No Action alternative, the historic condition of having the gates raised for six months of the year, from November 1 until April 30. Tables 6 and 7 present information on the No Action alternative with six months of "gates-up" operation. It also discusses the requirements of the National Marine Fisheries Service (NMFS) Biological Opinion for the long-term operation of the Central Valley Project (pages 1, 19, 20, and 21). The Biological Opinion requirement that the gates at Red Bluff be kept in the raised position for eight months of the year beginning in the fall of 1994 applies irrespective of whether or not the pilot pumping plant is constructed. To avoid confusing some readers who might conclude that the gates will be raised for two additional months only if the pumping plant is built, we suggest including the text from page 54 of the Biological Opinion which states:

Sacramento River Division

6. Pursuant to the following schedule, the gates of Red Bluff Diversion Dam must remain in the raised position to provide unimpeded upstream and downstream passage for winter-run chinook salmon:
  - a. The gates of Red Bluff Diversion Dam must remain in the raised position through at least April 30, 1993.
  - b. The gates of Red Bluff Diversion Dam must be raised on November 1, 1993 and remain in the raised position through at least April 30, 1994.
  - c. On September 15 of each year commencing in 1994, the gates of Red Bluff Diversion Dam must be raised and remain in the raised position from September 15 through at least May 14.

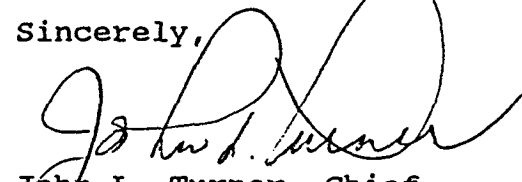
NMFS will review proposals for intermittent gate closures of up to 10 days one time per year on a case-by-case basis. Reclamation recently reinitiated consultation with the NMFS for activities related to construction of the pilot pumping plant but the request was not to change the essence of the above schedule.

We appreciate all of Reclamation's efforts at bringing this project closer to reality and look forward to continued cooperation as the process moves towards construction and operation.

Mr. Roger Patterson  
July 12, 1993  
Page Three

If you have any questions or wish to discuss our comments in greater detail please contact Mr. Dick Daniel, Environmental Program Manager, Environmental Services Division, Department of Fish and Game, at the above letterhead address and telephone.

Sincerely,



John L. Turner, Chief  
Environmental Services Division

cc: Mr. Dick Daniel  
Department of Fish and Game  
Sacramento, California

Mr. Jim Smith  
U.S. Fish and Wildlife Service  
Red Bluff, California

Mr. Chris Mobley  
National Marine Fisheries Service  
Santa Rosa, California

Mr. Terry Mills  
Department of Fish and Game  
Sacramento, California

The Honorable Douglas P. Wheeler  
Secretary for Resources  
Resources Agency  
1416 Ninth Street  
Sacramento, California 95814

July 7, 1993

Amendment to US Corps of Engineers Public Notice 199300289 of the Sacramento District for the Construction and Operation of a Pilot Pumping Plant at the Red Bluff Diversion Dam, Tehama County

The Department of Fish and Game has reviewed the subject amendment to the Corps of Engineers Public Notice 199300289 for the construction and operation of a pilot pumping plant at the Red Bluff Diversion Dam in Tehama County. The amendment is for inclusion of channel modifications upstream of the project to provide improved sweeping flows past the intake of the pumping plant. Additionally, the construction activities described in the initial application have been changed to reposition the intake by rotating the structure nine degrees into the river.

Repositioning of the structure is not expected to affect the Sacramento River or its resources any differently than the initial design. Department comments dated January 15, 1993 (attached) on the original public notice remain valid and all of the conditions we recommended from our comments should be incorporated into any permit issued for this project.

Channel modifications suggested in the public notice include dredging, placing groins in the river to direct flow, and constricting the river with the construction of a sheet pile wall 2,000 feet long. These channel modifications all have the potential to significantly affect water quality in the Sacramento River unless proper sediment control measures are implemented. These measures include isolating the work area with berms constructed of clean gravel or sheet piling, proper disposal of the dredged materials, and minimizing operation of heavy equipment in the flowing river. Conditions 1 and 2 of our January 15, 1993 memorandum concerning Public Notice 199200864 address water quality for construction of the pilot pumping plant. These same conditions should provide adequate water quality protection for the activities described in this amended application.

Selection of Option 2 (groins) and Option 3 (construction walls) would result in construction of relatively permanent structures in the river. Inasmuch as their effectiveness in achieving the stated goal is uncertain, we prefer that the Bureau



The Honorable Douglas P. Wheeler  
July 7, 1993  
Page Two

of Reclamation (Bureau) first pursue dredging and gate manipulation to accomplish sweeping flow velocities past the intake. Not only will this approach be less invasive but it will also allow the Bureau to obtain empirical information relevant to design and construction of the structural remedies if they become necessary. The preliminary environmental impact information regarding the groins and constricting wall is not sufficient to definitively conclude that these alternatives would be environmentally benign.

The environmental assessment for the pilot pumping plant discusses the need for improved sweeping flows past the intake. In the document the Bureau concludes:

*"Channel modifications may be subject to separate environmental documentation at a later date depending on their scope and nature, as developed and as determined to be necessary, to generate adequate sweeping flow past the PPP."*

If it is determined that the channel modifications are a separate Federal action and will require the preparation of separate environmental documentation, we will review and comment on the proposals at that time. If it is determined that no additional environmental documentation is needed, then we will recommend specific measures to the Bureau to achieve water quality standards and minimize construction impacts. These specific recommendations cannot be made until we receive final design specifications.

Thank you for the opportunity to provide comments on this public notice. If you have any questions you may contact Mr. Rich Elliott, Regional Manager, Department of Fish and Game, 601 Locust Street, Redding, California 96001, telephone (916) 225-2363.

Original signed by  
John L. Turner

John L. Turner, Chief  
Environmental Services Division

Attachment

cc: See attached list

The Honorable Douglas P. Wheeler  
July 7, 1993  
Page Three

cc: Mr. Rich Elliott  
Department of Fish and Game  
Redding, California

Central Valley Regional Water  
Quality Control Board  
Redding, California

Mr. Jim Smith  
U.S. Fish and Wildlife Service  
Red Bluff, California

Mr. Chris Mobley  
National Marine Fisheries Service  
Santa Rosa, California

Bureau of Reclamation  
Response to Comments Made By  
the California Department of Fish and Game  
Letter dated July 12, 1994

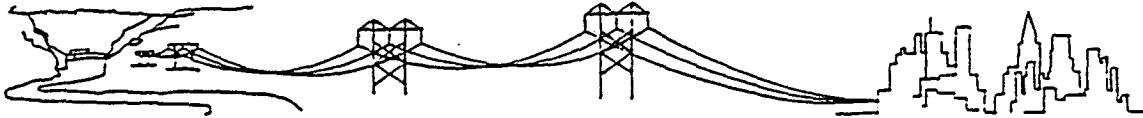
The Environmental Assessment (EA) as currently written includes information as provided. However, on review it may better serve the interested public to present this information in the format you suggested. It will be added in the EA as well as at the end of the document in Appendix E as well.

G-7

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C-065863

# CENTRAL VALLEY PROJECT



1851 Heritage Lane  
Suite 223  
Sacramento, CA  
95815-4926

## CUSTOMER TECHNICAL COMMITTEE

Chairman, Roger A. Fontes  
Northern California Power Agency

Vice Chair, Linda C. Hensley  
Sacramento Municipal Utility District

PO Box 255468  
Sacramento, CA  
95865-5468  
Phone (916) 929-3653  
Fax (916) 929-1710

July 12, 1993

Mr. Dan Fults  
Assistant Regional Director  
U.S. Bureau of Reclamation  
Mid-Pacific Regional Office  
2800 Cottage Way  
Sacramento, California 95825-1898

Dear Mr. Fults:

Subject: Comments on June 1993  
Revised Draft Environmental Assessment  
Red Bluff Diversion Dam Pilot Pumping Plant Program

### Introduction

The Central Valley Project (CVP) Customer Technical Committee wishes to provide the following comments on the subject Revised Draft Environmental Assessment (EA). The CVP Customer Committee represents the CVP wholesale power customers of the Western Area Power Administration (Western). Power sold by Western in the CVP is used or resold by preference customers without profit. Ultimate customers include millions of utility ratepayers served by 11 public utility districts, 20 irrigation districts, 24 federal installations, one rural electric cooperative, eight state agencies, and 14 California cities and utility districts throughout northern and central California. The CVP Customer Committee has a continuing interest in this pilot program because, when the CVP serves a larger electric load for its pumps, the power available to Western for fulfilling contracts to its preference customers is decreased. This causes Western to use more expensive resources, with varying environmental consequences due to that increased use.

### Comments

We and our consultants have reviewed the subject document and have held several phone conversations with members of your EA team. Based on this, we understand that the matter of economic and environmental costs of electric power for running the pilot program pumps has been estimated by the Bureau as being too small to warrant listing in the text of the EA. We believe that in the sections of the EA dealing with socio-economic and environmental

### Representing:

Cities of Alameda, Biggs, Gridley, Healdsburg, Lodi, Lompoc, Palo Alto, Redding, Roseville, Santa Clara, and Ukiah; Plumas Sierra REC; Sacramento, Shasta Dam, and other public utility districts; Modesto, Turlock, Westlands, Arvin Edison and other water and irrigation districts; Departments of the Navy, Air Force, and Army; Stanford Linear Accelerator Center, Lawrence Livermore Laboratory, and other federal agencies; and the University of California, Davis, and other state agencies.

July 12, 1993

considerations, the Bureau should include specific language which indicates these findings; e.g., that the potential environmental impacts of this program are minimal or too small to formally deal with. This would remove the incorrect impression that there is zero socio-economic or environmental costs as a result of using CVP hydroelectric power for this new electric load.

Moreover, in the Bureau's response to the December 7, 1992, letter from the Northern California Power Agency (NCPA) (included in Appendix B of the subject EA), you state that electric power for the pilot pumping plant will be supplied from existing CVP resources. While this may be a true statement, it is also true that the proposed pumps will be a new project load. Increasing project load has potential environmental consequences beyond the immediate area of Tehama County. Other parameters remaining equal, the power used for the pumps will be provided by another resource (very probably from fossil fuel sources) with commensurate monetary and environmental costs.

#### Conclusion and Recommendation

We think that the written material on pages 34-35 of the EA should include specific language about the existence of potential impacts on existing air quality and socio-economic issues, even if they are judged to be relatively small. To accomplish this, we suggest the following insertion on page 35 under the heading Affected Environment:

"The new pilot project pumping loads will necessitate incremental power generation for federal CVP power customers. We estimate this impact to be small."

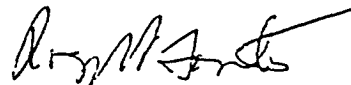
We also suggest the following be added on page 35 under the heading Environmental Consequences:

"For the proposed alternative, there will be a small risk of potential impact on environmental quality due to incremental fossil fuel power generation."

Thank you for this opportunity to comment on the EA. If you have questions or comments on our letter, please call me at 916-781-4203.

Sincerely,

CENTRAL VALLEY PROJECT CUSTOMER  
TECHNICAL COMMITTEE



Roger A. Fontes  
Chairman

RAF:HM:jm (D:11257C.070)

c: Mr. Roger Patterson  
Mr. Jim Feider  
Mr. Michael W. McDonald

bc: CVP Customer Technical Committee  
Mr. Pat Fulton

Bureau of Reclamation  
Response to Comments Made By  
the Central Valley Project - Customer Technical Committee  
Letter dated July 12, 1994

Comments on the Draft Environmental Assessment (EA) for the Red Bluff Diversion Dam Pilot Pumping Plant (PPP) Program regarding Central Valley Project electric power impacts have been noted. As stated in the EA, the power needed to operate the proposed PPP will be made available from existing sources, and thus, environmental affects attributable to this action are expected to be negligible.

To ensure a complete disclosure of impacts, we have added wording similar to that which you suggested.

G-10

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C-065866



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Southwest Region  
501 West Ocean Boulevard, Suite 4200  
Long Beach, California 90802-4213  
TEL (310) 980-4000; FAX (310) 980-4018

JUL 14 1993

F/SW031: C JUL 19 1993

BUREAU OF RECLAMATION  
OFFICIAL FILE COPY  
RECEIVED

Mr. Roger K. Patterson  
Regional Director  
U.S. Bureau of Reclamation  
Mid-Pacific Regional Office  
2800 Cottage Way  
Sacramento, California 95825-1898

Dear Roger,

Thank you for requesting comments on the second revision of the Draft Environmental Assessment (EA) for the Red Bluff Pilot Pumping Plant (RBPPP). In a letter dated June 24, 1993, you also requested reinitiation of consultation concerning the RBPPP project in order to accommodate project modifications that are assessed in this draft EA.

A meeting was held between our respective staffs on June 30, 1993, to discuss the RBPPP project modifications and the consultation process. Several issues arose during the meeting that need to be resolved as soon as possible so that the reinitiated consultation may be completed in the timeframe you requested. The following comments on the draft EA address these issues:

(1) Bureau requests for more flexibility in operating RBDD should be based on evidence showing historic water demand and delivery rates.

The EA does not provide any analysis of historic water demand and deliveries to Tehama-Colusa (T-C) canal water users. This information, broken down into monthly delivery rates, is critical for the ongoing Section 7 consultation, and for future interagency consultation during real-time management of the Red Bluff facilities.

The pilot pumping plant will provide up to 300 cfs water delivery once it is constructed. The existing "temporary" pump facilities provide 125 cfs. The Stony Creek CHO (constant-head orifice) facility can provide up to 300 cfs to the Tehama-Colusa canal. Thus, these facilities may provide up to a total of 725 cfs.

During the meeting on June 30, Mr. Rich Kristoff of your staff requested more flexibility in the operations of the Red



Bluff Diversion Dam (RBDD) gates to meet water delivery needs. Apparently, there is concern that the September 15 through May 15 gates-up operation required by the Long-term Operations CVP-OCAP opinion may prevent adequate water deliveries and require the Bureau to request temporary gate closures.

However, while strongly weather dependent, T-C deliveries averaged 130 cfs in March and 301 cfs in April over the last eight years (Mr. Kristoff, pers. comm.). Even without the pilot pumping plant, it appears that normal delivery needs could be met without gate closures by using the 425 cfs total capacity available from the Stony Creek CHO and "temporary" pump facilities. Unless evidence is provided to demonstrate the Bureau's inability to meet water delivery needs, I will assume that the Bureau will be able to meet water delivery needs while complying with a September 15 through May 15 gates-up operation.

(2) The need for RBDD gate closures during sheetpile cofferdam construction and removal should be clarified.

According to the EA, the gates would need to be closed during RBPPP construction, which will occur from about April 1 through December 1, 1994. However, the EA also states that "the impediment will be limited to the period when sheetpiling is being installed or removed." First, the EA does not describe why the gates need to be lowered to allow cofferdam construction and cofferdam removal. Cofferdams are routinely constructed and removed without upstream flow control. Second, the EA does not adequately define the time periods of cofferdam construction and removal. If the Bureau can demonstrate the need to lower the gates during cofferdam construction, it would be ideal to limit this period to the minimum time necessary to complete construction by April 30, 1994. If cofferdam construction can be completed in two weeks, then the gates should not be lowered until April 15, 1994. This would maximize the time period of unimpeded passage for winter-run chinook salmon to their spawning grounds upstream of Red Bluff.

(3) The monitoring and evaluation studies should be included in the EA.

The RBPPP is an experimental facility. As stated on p. 21 of the EA, one of the primary purposes of the project is to "design a test facility that minimizes salmonid mortality while allowing a thorough assessment of the appropriateness of this type of facility as a long-term solution." Therefore, without monitoring and evaluation studies to determine the effectiveness of this facility to both deliver water and reduce fish mortality, the stated project purpose will not be achieved. Further, the Bureau recognizes that there may be some unforeseen sources of salmon mortality, and has made the commitment to correct to the extent practicable any design or operational sources of mortality found during the evaluation studies (p. 22 of the EA). Finally, development and implementation of a comprehensive biological



monitoring and evaluation plan is one of the terms and conditions of the RBPPP biological opinion.

Mr. Charles Liston of the Bureau's Denver office has developed a preliminary document on the proposed scope of biological research and evaluations for the RBPPP (dated September 27, 1992). Given the importance of biological monitoring and evaluation, I am concerned that there has been little or no apparent progress in finalizing and funding this mandatory component of the overall project. I had expected that a monitoring and evaluation plan would have been adequately defined in time to include it in the draft EA. The Bureau should commit to implementing the biological monitoring and evaluation plan in Appendix A of the EA (Environmental Commitments).

(4) The proposed alternative methods for improving sweeping flows at the facility should be phased.

The most significant change in the current draft EA is the addition of measures to address sweeping flows at the intake to the RBPPP. These measures include dam gate manipulations, dredging, and construction approaches such as the installation of groins or channel restrictors. In order to minimize the potential impacts of these measures, the Bureau should start with gate manipulations and dredging, monitor sweeping flows, and move on to groin and channel restrictors only as necessary to achieve adequate sweeping flows. The Bureau should include monitoring and evaluation of these sweeping flow improvement measures and associated biological impacts as part of the overall biological monitoring and evaluation plan.

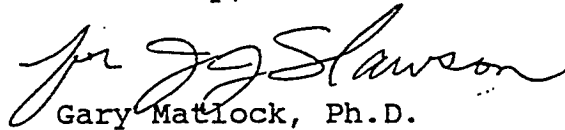
Based on the available information, I think that gate manipulation to achieve sweeping flows should not create more than a 1.2' head differential across the dam, and that dredging should be restricted to the period of January 1 through April 15 of each year in order to avoid the fall-run and winter-run chinook salmon spawning periods. If these two objectives cannot be met, then your staff should present evidence for this during the ongoing Section 7 consultation.

(5) The EA should describe the need to shut down two bypasses in the T-C screen facility in order to tie in bypasses from the RBPPP.

The fish bypasses from the RBPPP will be tied into two of the four existing T-C screen facility fish bypasses. This will require two of the T-C fish bypasses to be shut down for a two week period in June 1994 (Mr. Kristoff, pers. comm., October 1, 1992). During the shutdown of these bypasses, outmigrating juvenile salmon may be delayed in their passage back to the river through the T-C screening facilities. Therefore, the EA should describe this potential impact on juvenile salmonids and make a commitment to limit bypass shutdown to a two-week period.

If you have any questions regarding these comments please  
contact Mr. Christopher Mobley at (707) 578-7513.

Sincerely,

A handwritten signature in cursive script, appearing to read "G. Matlock".

Gary Matlock, Ph.D.  
Acting Regional Director

Bureau of Reclamation  
Response to Comments Made By  
National Marine Fisheries  
Letter dated July 14, 1994

Comment #1: Your request for evidence showing historic water demands and delivery rates will accompany any future request by Reclamation for additional flexibility in operating RBDD. As a result of discussions between Reclamation representatives in the Willows office and NMFS, agreement has been reached to provide specific information, as requested by NMFS, whenever operating flexibility becomes necessary.

Reclamation would like to take this opportunity to clarify a few points addressed in this comment. The PPP will provide 270 cubic feet per second (cfs) water delivery once it is completed, not 300 cfs as stated. Thirty cfs will be redirected to the fish bypass. Also, the existing "temporary" pump facilities will provide only 100 cfs, not the 125 cfs as stated. Reclamation intends to operate only those pumps that can be screened. Therefore, it is anticipated that only 100 cfs capacity will be realized.

The Stony Creek CHO (constant head orifice) is not yet approved and will require a point of diversion permit, as well as a separate EA (and accompanying mitigation measures). Currently, it is not available for contributing to water demand. Therefore, a total of only 370 cfs (270 and 100 as discussed above) can be made available for delivery, not 785 cfs as stated.

Comment #2: Changes to clarify gate closures at RBDD during sheetpile cofferdam construction and removal will be added to the EA.

Comment #3: Monitoring and evaluation studies will be referred to in the EA and be included in the newly created Appendix F.

Comment #4: Phasing in of alternative methods for improving sweeping flows at the facility have been noted and will also be discussed in the EA.

Comment #5: The need to shut down two bypasses in the T-C screen facility for a two week period in June, 1994 is no longer correct. The bypass work will take place from November, 1993 to April, 1994 or from November, 1994 to the end of the construction period. These scheduled dates all fall within the period of gates-up operation at RBDD when the bypass is not operating. Therefore, no changes or additions will be made in the EA.

APPENDIX H  
U.S. FISH AND WILDLIFE SERVICE  
COORDINATION ACT REPORT

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C-065872



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Ecological Services  
Sacramento Field Office  
2800 Cottage Way, Room E-1803  
Sacramento, California 95825-1846

July 16, 1993

To: Regional Director, Mid-Pacific Region,  
U.S. Bureau of Reclamation, Sacramento, California  
Attn: Planning Division, (Carol Sakamoto, MP-750)

From: Field Supervisor, Ecological Services  
Sacramento Field Office, Sacramento, California

Subject: USBR-Red Bluff Diversion Dam Fish Passage Study - Pilot Pumping  
Plant

The attached draft Fish and Wildlife Coordination Act (FWCA) report is provided in accordance with the Scope of Work for FY 1993. Herein, we report potential beneficial and adverse impacts of the construction and operation of the proposed Pilot Pumping Plant facility near Red Bluff Diversion Dam. Our analysis is based on the second draft Environmental Assessment, and supporting engineering documents provided prior to July 13, 1993. Any additional changes in the designs will require a reinitiation of consultation pursuant to the FWCA for further analyses and recommendations.

Because of your aggressive planning schedule and the resulting short lead time to prepare this draft report, we have only discussed these issues informally with your staff, and representatives of the National Marine Fisheries Service (NMFS) and the California Department of Fish and Game (CDFG). By copy of this letter, we request that any comments on this document by these agencies or other concerned parties be provided to us by August 16, 1993.

This report was coordinated with our Northern Central Valley Fishery Resource Office in Red Bluff. If you have any questions regarding the enclosed draft FWCA report, please contact Steve Schoenberg or Roger Guinee in Sacramento at (916) 978-4613, or Jim Smith in Red Bluff at (916) 527-3043.

*Richard W. De Haven*  
for Wayne S. White

Attachment

C - 0 6 5 8 7 3

C-065873

cc: ARD, ES, FWS, Portland, OR  
USBR, Denver (Perry Johnson), CO  
USBR, Willows (Rich Kristoff), CA  
FWS, NCVFRO, Red Bluff  
NMFS, Santa Rosa  
EPA, San Francisco  
CDFG, ESO, Sacramento  
CDFG, Region I, Redding  
CDFG, Inland Fisheries Division (Randy Benthin), Chico

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C-065874

UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE  
COORDINATION ACT DRAFT REPORT

RED BLUFF DIVERSION DAM/FISH PASSAGE  
STUDY: PILOT PUMPING PLANT

Prepared by

United States Fish and Wildlife Service  
Division of Ecological Services  
Sacramento Field Office  
Sacramento, California

July 1993

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C-065875

## I. Introduction

### A. Background

Operation of Red Bluff Diversion Dam (RBDD) on the Sacramento River commenced in 1966 to provide irrigation water as part of the Central Valley Project, and has the capacity to divert as much as 3,000 cubic feet per second (cfs). Since that time, a number of adverse impacts on salmon and other anadromous fishes have been related to its operation, the most important of which are delayed or blocked upstream passage of the adults past RBDD to prime spawning grounds, predation on juvenile salmon within Lake Red Bluff (formed by the diversion dam), and predation on juvenile salmon downstream of RBDD. Until the recent installation of modern drum screens, losses into the Tehama-Colusa Canal (TCC) were also significant. Additional impacts include physical injury to juveniles while passing under the gates or through the screen facilities, loss of spawning habitat in the lake reach, and increased water temperatures in the lake and downstream of RBDD. The cumulative impacts of RBDD and other projects caused an alarming decline in the salmonid populations of the upper Sacramento River. Total salmon passing RBDD declined from several hundred thousand in the late 1960's to a low of 53,336 in 1992. The decline was particularly severe for the winter-run chinook salmon, which waned from a peak of 117,808 individuals in 1969 to a mere 191 adults in 1991. The spring-run salmon also reached a historical low of only 410 fish in 1992.

In a 1992 appraisal study of long term solutions to improve passage conditions for anadromous fish, the Bureau of Reclamation (Reclamation) selected four alternatives for further study, two of which included the use of pumps to convey water with the RBDD gates raised, thereby permitting unimpeded upstream and downstream passage of anadromous fish. The low velocity feature of large screw, or "Archimedes", style pumps offers particular promise as an alternative to the dam which would provide both water supply, yet minimize adverse impacts to fishery resources. However, use of Archimedes pumps has not previously been attempted for application in a riverine environment nor at the scale needed to replace the gravity diversion of RBDD. The pilot pumping plant has been proposed to provide empirical data on hydraulic and biological effects likely to occur at and around the pilot plant, maintenance requirements, and reliability of the system.

### B. Project Description

The proposed site for the Red Bluff Pilot Pumping Plant (RBPPP) is on the west bank of the Sacramento River, just below RBDD at about river mile 243. The facility will include two archimedes pumps (100 (cfs) maximum capacity each and a maximum speed of 26.5 revolutions per minute (rpm)), one screw-impeller centrifugal pump (100 cfs maximum capacity and 450 rpm maximum speed), and one empty bay for future expansion. In-river works include the trashrack and associated sheetpiling, pumps, and drywells. The RBPPP will also have modern screening and evaluation facilities, and will convey fish back to the river through one of the bypasses for the existing drumscreens. The project will likely



include one or more modifications, described below, to improve sweeping flows past the pump intakes. For purposes of analyzing potential impacts, these channel modifications could extend as much as 1,500 feet above RBDD to 1,200 feet below RBDD.

### C. Previous Service Documents

Fish and Wildlife Service (Service) representatives have attended the on-board review for the planning and design of the RBPPP since its inception. Documents include our comments on the initial design (memorandum of March 26, 1992), on the draft Environmental Assessment (EA) (memorandum of September 4, 1992), and on the first revised draft EA (memorandum of November 25, 1992). In these documents, the Service indicated general concurrence with the siting and size of the facility, the bypass system, the trashrack design, and the screening system. We emphasized the experimental purpose of the facility, and the need to document minimal impact on fish, defined as equal to or less than gravity diversion, as a condition for committing the pilot plant to long-term operation for water conveyance purposes. We also expressed concern that recent modifications may impact efficiency of the west-bank fish ladder. Further refinements in the intake position, and need for channel modifications as indicated in the second revised EA require us to review this concern and other potential impacts.

### D. Modifications of the Action Alternative

Sweeping flows in the range of 1 to 4 feet per second (fps) are necessary to reduce debris loading and entrainment of fish into the pumps. At the proposed site for the RBPPP, flows near the intake site are attenuated by several features, including deposition from Red Bank Creek above and below RBDD, the cross channel gradient, and the drumscreen conduits downstream of the site. Results of physical model and field studies at the site (unpublished, but provided to the Service by Perry Johnson, USBR-Denver) indicate several design changes are needed to achieve appropriate sweeping flows across the intakes of the RBPPP. The objective of these design changes would be to allow full capacity operation with the dam gates raised.

#### 1. Modified Intake Location

As mentioned in the second revised draft EA, positioning of the 200-foot-long trashrack has been altered so that it would be rotated about 9 degrees into the flow. From the west edge of the west bank fish ladder, specifications show the upstream end of the trashrack would extend about 25 feet into the river and the downstream end about 80 feet into the river. Sheetpiling would be installed from about 10 feet downstream of the west bank fish ladder to the upstream edge of the trashrack, and from the downstream edge of the trashrack several hundred feet to the existing bypass conduit, then connecting to the west bank.

## 2. Gate Manipulation

Because the RBDD gates operate independently, the center gates could be partially or completely closed to concentrate flows near the banks. Gate operation is limited by the maximum allowable 1.2 foot differential between gates, and this action alone may not generate the minimum sweeping velocity under all river conditions. Manipulation of the gates could also be used to sluice sediment away from the intake structure, disperse predators, or perform short-term tests by modifying the flow fields.

## 3. Channel Modifications

### a) Dredging

A significant amount of fine gravel and sand material has been deposited above and below RBDD, and is believed to be the most important factor influencing site hydraulics. According to the application for an amended permit (Public Notice No. 199300289), dredging would occur along the west bank from the mouth of Red Bank Creek to RBDD covering a volume about 800 feet long, 50 to 60 feet wide, and 5 feet deep or more, and from RBDD downstream to the RBPPP intake (400 feet long, 60 feet wide, 5 feet or more in depth). About 10,000 to 15,000 cubic yards (CY) of sediment would be affected.

Options would be either suction dredging done with the RBDD gates down, use of bank based methods when the river is at low flow, or displacement of bar material into the thalweg.

### b) Groins

The groins would be submerged structures of sheet piling or rock fill extending from the east bank partially across the channel which would be used to maintain the thalweg on the west side of the channel, thereby improving sweeping flows, and sluicing additional Red Bank Creek deposition which may occur. They would be about 300 to 400 feet long and spaced about 300 feet apart, extending about 1 to 3 feet above the existing river bed. Figures in the permit application show five groins upstream of RBDD and two groins downstream of RBDD, totalling about 3,000 to 6,000 CY of fill.

### c) Channel Constriction and Groins

The channel constriction would be a 2,000 foot length of sheet pile extending from the east bank about 200 feet above RBDD upstream to the existing low terrace at about elevation 240. Installation would require excavation of about 2,000 CY of sand, and backfill of 15,000 CY of sand and gravel.

#### d) Combination of Above

Reclamation has indicated that some combination of channel modifications may be required, pending completion of ongoing physical model studies.

## II. Existing Resources

### A. Vegetation

The dominant cover types present near RBDD are valley grassland and riparian vegetation. Common species include cottonwoods, willows, alders, sycamores, and understory shrubs. However, in the impact area of the proposed project, most of these communities have already been cleared for agriculture and other purposes. A few young willows are present on the west bank where the pumping plant would be constructed, however, the entire length of this bank from the dam downstream to the bypass has been modified by either rock riprap or sheet piling, severely limiting encroachment of vegetation along the bank. Some larger trees are present on the high terrace bordering the east bank downstream of RBDD. Vegetation on the river's edge is inhibited by riprapping of the east bank from RBDD to about 1,200 feet downstream.

The increased water level of Red Bluff Lake precludes establishment of typical riparian cover along the river banks upstream of the dam. Additionally, the 3,000 feet of west bank upstream of the dam have been stabilized by a combination of rock riprap, sheetpiling, and the inlet works to the TCC. The surrounding area both upstream and downstream is either urbanized, or covered with grasses, wild oats, star thistle, and other plants typical of disturbed areas.

### B. Fisheries

All four runs of chinook salmon (fall, late-fall, spring, winter) and steelhead trout migrate through the project area. The best temperature and habitat conditions for salmonid spawning are upstream of Lake Red Bluff, however, significant numbers of salmon do spawn downstream of RBDD, and redds have been noted immediately downstream of the project area (e.g., DWR 1984). Other anadromous fish species include both green and white sturgeon, American shad and striped bass. Other native fish are also abundant, such as rainbow trout, Sacramento squawfish, California roach, hitch, hardhead, and suckers. Among the introduced fish are several sunfish and black bass species, mosquitofish, carp, several catfish species, golden shiner and others.

### C. Wildlife

Mammal species near the project site are typical of the surrounding area, and include blacktailed deer, raccoon, jackrabbit, squirrels, skunk, beaver, and river otter. In addition, a wide variety of waterbirds, waterfowl, raptors, gamebirds, and songbirds occur in the area.

### D. Threatened and Endangered Species

The following discussion of Federally-listed threatened and endangered species should be regarded as preliminary information. For this project, information provided in a subsection of the EA serves as the Biological Assessment of impacts on status species. We also recommend that the Corps of Engineers (Corps) review its requirements, published in 50 CFR 402, for full compliance with the Act.

On August 25, 1992, the Service issued a list for the project area of all Federally-listed and proposed threatened and endangered species (Appendix A). A summary of a Federal agency's responsibilities under Section 7(a) and (c) of the Endangered Species Act (ESA) of 1973, as amended is appended to this list. Although these species are known to occur in the general vicinity of the project, none are currently present within the construction site. Thus, no further impacts of the project on Federally-listed species or candidate species for listing is anticipated.

The ESA consultation regarding the Federally-threatened winter-run salmon should be with the National Marine Fisheries Service (NMFS). The timing of construction, choice of channel modifications, extent and timing of channel maintenance, and operation of the pump/evaluation facility complex should be coordinated with NMFS to avoid or minimize potential impacts on this species.

## III. Impacts

### A. No-action Alternative

The February 12, 1993 Biological Opinion prepared by the National Marine Fisheries Service on the Central Valley Project Operating Criteria and Plan (CVP-OCAP) requires "gates-up" operation of RBDD be extended to between September 15 through May 14 beginning in 1994, compared to recent operation from November 1 through April 30. The capacity of the RBPPP is such that deliveries to users along the TCC, including wildlife refuges, could be maintained for this additional 60 days of gates-up operation. Water needs for Sacramento, Delevan, and Colusa National Wildlife Refuges are relatively high during September and October, and are currently supplied by Central Valley Project (CVP) water (Bureau of Reclamation 1989) and delivered by Glenn-Colusa Irrigation District (GCID) via its Pumping Plant near Hamilton City or the TCC, when GCID does not have the pumping capacity available. Under the no-action alternative, CVP water would not be available via

the TCC for this period. Thus, the no-action alternative would limit the capability of Reclamation to meet level 2 refuge supplies as mandated by Congress (Public Law 102-575).

Failure to meet refuge supplies could result in reduced survival of waterbirds that use these areas as wintering habitat, which is extremely limited in the Central Valley.

The fate of undelivered water cannot be specified at this time, and would depend on flood control operations, demands elsewhere in the Central Valley, and reservoir storage. Lack of delivery in September and October would likely result in increased carryover storage in Shasta Reservoir. Undelivered water in early May might be withheld for delivery later in the year, or released downstream to maintain floodspace in Shasta Reservoir. The volume delivered by the RBPPP (maximum capacity of about 358 cfs) together with other reduced deliveries, may result in increased reservoir storage and instream flows. Such conditions could be interpreted as being modestly beneficial to riverine aquatic resources.

However, the primary purpose of the project is to provide data needed to determine the effectiveness of a larger scale pumping facility of this type as a long-term solution. In addition to providing interim benefits (two months additional gates-up operation), a major indirect benefit of the project is that it facilitates selection of the long-term solution. Among the alternatives under consideration is a full-scale "Archimedes" pumping plant which would eliminate the need for RBDD. The no-action alternative would very likely delay selection of a long term solution for an indefinite period. Delay in this selection would not resolve the fish passage problem and would thus constitute a relatively severe adverse impact of no-action.

## B. Action Alternative

### 1) Intake Position

The modified intake rotation and extension into the river will require a commensurate displacement of the cofferdam needed to construct in river works. The cofferdam is presently scheduled to be installed beginning March 15, 1994, and is to remain in place until September 3, 1994. This cofferdam is likely to have some impact on fish attempting to use the west-bank fish ladder because it will cause ladder flows to mix with flows from gate 11. Accordingly, we recommend that cofferdam construction be completed by May 1, 1994, when the RBDD gates are scheduled to be closed. The cofferdam should be removed no later than September 3, 1994. These restrictions would minimize impacts of construction activities on fish passage.

As discussed in our letter of November 25, 1992, we further recommend modifying present operation of gate 11, if necessary, while the cofferdam is in place. Gate 11 is an automatic gate used to sluice sediment and debris away from the existing trashrack area and to adjust the water level of Lake Red Bluff. To make the ladder more attractive to the fish, it may be necessary to reduce, or even eliminate flows, to gate 11 for short periods of time (i.e., 12 hours to several days), redirect flows to other gates to adjust water level. It is anticipated

that such short term operations would not result in problematic debris or sediment accumulation.

When the cofferdam is removed, the flows out of the west-bank fish ladder will be permanently altered so they follow the angle of the RBPPP and are directed in line with the downstream section of existing drumscreen bypass. This condition may actually produce somewhat improved lead-in flows towards the ladder, in that it directs the water towards the natural split in flow in the vicinity of the bypass outfall, rather than along the bank. The 9° rotation appears to fall within the recommended 1:8 limit for wall deflections (Bates 1992). Some additional mixing with gate 11 flows will remain with the rotated intake after the cofferdam is removed, although we do not anticipate that this will produce significant blockage or delayed fish passage. However, if adverse impacts on passage are observed, modified operation of gate 11 and/or fish ladder modifications may be necessary. Any necessary ladder modifications would be to mitigate impacts of the RBPPP only, and should not be construed as Service endorsement of ladder improvement as a long-term solution.

Furthermore, operation of the pumps with the gates down would very likely withdraw much of the water which is exiting the fish ladder. Initially, RBPPP operations should be limited to short-term tests (1 to 3 days) during the gates-down period, until effects on adult passage (e.g., delay, blockage, injury) are assessed. If no such impacts are observed, longer operations during the gates-down period would be considered acceptable by the Service.

## 2) Gate Manipulation

Use of gate manipulation to improve sweeping flows is a relatively benign action. No construction is proposed or anticipated for this operational change. Predators like squawfish and striped bass may concentrate in the eddy areas behind the closed gates; however, these could be dispersed by intermittent operation of these gates. As with other measures to improve sweeping flow, this action is beneficial in reducing the probability of entrainment into the pumps, and removing sediment and trash from the pump intakes which could otherwise affect pump efficiency and increase fish mortality.

## 3) Dredging

Most sediments in the area which is proposed for dredging consist of sand and fine gravels smaller than the preferred spawning substrate for salmon. Aerial surveys (California Department of Fish and Game, unpublished data) have documented salmon redds as close as several hundred feet downstream of RBDD; however, these locations do not overlap with the dredge site, which is closer to the west bank. Thus, no significant direct loss of salmonid spawning habitat is envisioned from this action.

Another potential impact of dredge operations would be increased turbidity levels, which would affect salmonid redds downstream. To minimize such impacts, we recommend that dredging be conducted, to the extent possible, between January 1 and April 15. This period

coincides with naturally high turbidity levels in the Sacramento River, and is after the spawning and incubation period of most of the fall-run chinook salmon, and prior to spawning of the winter-run. Dredging between April 15 and September 15 will result in some loss of winter-run juveniles or impact spawning which occurs downstream of RBDD. The period from September 15 to December 15 should also be avoided, because fines generated by dredging would result in a significant increase in turbidity over natural levels, and impact spawning downstream of RBDD. It is recognized that dredging may not be possible during high river flows which can occur during the recommended window, and that redeposition of material from Red Bank Creek during such high flows, may require dredging later in the year. The Service would, therefore, consider relaxing this restriction as acceptable on a case-by-case basis.

#### 4) Groins

At this juncture, we have not been provided a clear indication of whether or not groin treatment would be needed. The design criteria for inclusion of groins are assumed to meet the need for a sweeping flow of about 2 feet per second under the worst case low water conditions. This condition would most likely correspond to the 3,250 cfs from October 1 through March 31 required by NMFS at present for protection of the winter-run salmon.

Temporary localized disturbance would take place if the groins were installed. The timeframe for installation to minimize impacts should be similar to that for cofferdam installation (i.e. March 15 to April 30); any additional construction should be conducted as late as possible between January 1 and March 14. During the May 15 to September 15 gates-down operation, disturbance caused by groin construction might affect upstream migration of salmonids. After construction, the resultant improved sweeping flows may have the benefits of reducing entrainment of fish and debris into the intake, and possibly preventing predator accumulation near the intake. On the other hand, additional fish would be exposed to the intake structure, and impacts in the form of physical injury or predation could be elevated. By implementing the biological monitoring plan, we anticipate such impacts will be maximally avoided by responsive modification of plant operations. The sluicing action of the groins is likely to obviate the need for frequent dredging around the RBPPP intake. The placement of the groins appears to connect to bank areas which have been previously riprapped, and would not result in loss of cover in the form of undercut banks, exposed root zones, or overhead shading.

The groins upstream of the dam would not constitute a fish passage barrier, however, they may create significant predator habitat with the RBDD gates raised. As noted in the EA, the top of the groins (240 feet mean sea level (msl)) would begin to extend above the water surface at discharges less than 10,000 cfs. During the 1987 to 1992 drought, the lowest observed flow of around 3,800 cfs within the May 15 to September 15 gates-down operation period which would apply after completion of the pumping plant, would have exposed these groins to about mid-channel (238 msl). Greater exposure would occur as flows approach the lower, NMFS requirement. Thus, the groin treatment would create a large

backwater area in the slough upstream of the dam, and some slack water between the the groins. Predators like Sacramento squawfish prefer to hold in relatively slower-moving backwater areas (less than 1 fps) or eddies which could potentially form between or downstream of the groins. The predators might wait in separation zones and feed on smolts which are passing with the higher velocity west bank flows.

Another significant concern is whether downstream groins will aggravate the current problem of predator accumulation below the dam. Although the EA states that the design of the groins would minimize flow separation and predator habitat, backwaters are especially likely to develop during low flow periods. Recent observations suggest that predators congregate rapidly (i.e., days to weeks) below RBDD after the gates are closed, and could also accumulate around the groins with changes in river stage.

Downstream of the dam, flows intercepted and redirected by the groins may affect use of the east bank fish ladder. Most adult fish which would normally approach the ladder from the east bank could be redirected towards the west bank. To use the east-bank ladder, these fish would then have to negotiate their way through the backwater area between RBDD and the first groin below the dam, as well as turbulence caused by the dam gates. In general, areas where eddies, flow separations, or dead water should be eliminated to the extent possible around fishway entrance pools and channels (Bates 1992). This potential problem would become increasingly serious at lower river flows. The groin nearest to the dam would have an elevation of 237 feet msl near the left bank, sloping to about 236 feet msl at mid-channel (Perry Johnson, Reclamation, personal communication). Assuming an approximate stage of 238.5 feet msl at the 3,250 cfs minimum flow, these lower groins would be submerged, but still close enough to the water surface to obscure much of the flow towards the east, and possibly the center, ladders. It is difficult to portray the exact hydraulic conditions behind the groins, as we note about one foot of variation in the tailwater stage has been observed as a result of different gate configurations.

Based on operations during the 1987 to 1992 drought, the lowest flows (within the April 15 to September 15 gates-down period) have occurred around the beginning of the gates-down period in mid-April, corresponding to the peak upstream migration of winter-run salmon, and towards the end of the gates-down period in mid-September, coinciding with the early fall migration of the fall-run salmon. It is likely that any impacts on salmon passage may be ameliorated, in part, by increased use of the west-bank fish ladder, as the improved sweeping flows past the intake may result in increased attraction towards this ladder. However, as previously mentioned, the effectiveness of the west-bank ladder might also be impaired by the pumping plant intake structure. These flows would only occur during very dry years, when temperature conditions below RBDD are inadequate for salmonid spawning. Thus, the groins could have the greatest adverse impact on passage during years when it is critical for the adults to spawn upstream of RBDD.

At both upstream and downstream locations, the in-river work would involve substantial temporary disturbance, and the groins would probably elevate predation levels during the



gates-up period. During gates-down operation, predation losses are already high within Lake Red Bluff, and downstream of RBDD. Furthermore, we have not been provided justification that the groin structures are essential in addition to the gate manipulation and dredging options, or sufficient information on the flow regime which would address our concerns regarding predator habitat. Such structures, once constructed, would be difficult to modify. Reclamation very recently indicated that model studies show gate manipulation and dredging would have comparable flow benefits to the other modification options considered. Therefore, the Service recommends that groin construction not be pursued at this time, and not be included in the Corps permit. The Service would be willing to reconsider these channel modifications, if Reclamation provides sufficient documentation as to the need, and a thorough explanation on how the proposed design will minimize potential predator habitat and passage problems.

Because of the close proximity of the structures to the fish ladders, the Service recommends that construction of groins downstream of the dam in particular, be avoided. Should Reclamation determine that the downstream groins must be considered to permit proper operation of the pilot plant, we recommend that the Service and Reclamation develop a contingency plan in the event that the combination of water availability and groin obstruction results in significant blockage or delay in passage of salmonids and other anadromous fish. Components of this plan should include: (a) funding of studies necessary to document the degree to which blockage or delay in fish passing the ladders is significantly increased as a result of groin construction; (b) a binding commitment on any action(s) which would be performed to provide for passage in the short term should such blockage or delay be observed; and (c) performing further modifications of the channel which would result in increased passage over the long term.

#### 5) Channel Constriction with Groin Treatment

Unlike the groins, this option would seal the downstream entrance to the left bank slough. At flows less than about 10,000 cfs, a pool area is created which would attract predators that may feed on juvenile salmonids at the flow separation zone upstream. Channel constriction differs from the groins only treatment in that the continuous obstruction would, at low river flows, isolate this potential predator habitat from the main flow of the river. Thus, predators would feed only at the upstream end of the slough with the channel constriction; the groins would permit predators to hold and feed from between the groins. In addition, local benthic production would probably be reduced by the lack of flow, and there may be increased deposition of fines in the area. Slack water would also be undesirable for rearing or spawning, in the event that a full-scale pumping plant is built and restoration attempted for the present lakebed area. For the same reasons as indicated above for the groins only treatment, we recommend that this option not be included in the Corps permit.

#### IV. Conclusions and Recommendations

The Service maintains its support of the RBPPP project, and has no objection to its construction or the modified intake location. The project would provide essential data towards selecting a long-term solution, and would replace gravity diversion for an additional sixty days of gates-up operation. The delivery of water via TCC has a further potential benefit of supplying Federal wildlife refuges, when GCID does not have pumping capacity available.

However, the associated channel modifications may result in adverse impacts in terms of reduced upstream passage, or increased predation on downstream migrants. To maximally avoid such impacts, we recommend:

- (1) The alternate intake position (9° rotation) be adopted.
- (2) Installation of the cofferdam should proceed between March 15 and April 30, 1994. The cofferdam be removed no later than September 3, 1994.
- (3) Operation of the facility when the RBDD damgates are closed be limited to short-term tests (1-3 days) to avoid obscuring flows from the west-bank fish ladder. Longer tests during gates-down operation be permitted only with the consent of the Service.
- (4) Reclamation agree to modify operations of gate 11, if necessary as determined by the Service, to attract fish to the east-bank fish ladder entrance.
- (5) Reclamation use gate manipulation and dredging only to achieve needed sweeping flows across the pump intakes.
- (6) Dredging be accomplished, to the extent possible, between January 1 and April 15. Dredging operations outside of this period be done only with the approval of the Service.
- (7) Other channel structures, including sheet pile walls or groins, should not be pursued at this time.
- (8) Future proposals for groins or sheetpile walls include: (a) a justification section demonstrating the need for the structure(s), to attain sweeping velocities; (b) a description of features intended to maintain existing passage conditions for adult salmon and other anadromous fish, and minimize predator habitat; and (c) a contingency plan to facilitate adult salmon passage in the event that the channel modifications, such as groins downstream of RBDD, result in unanticipated, significant fish blockage or delay in passage.

- (9) The complete post-construction monitoring plan be implemented by Reclamation and provide for assessing impacts of any approved channel modifications on predation losses and fish passage. The monitoring and evaluation be expanded to include all native fishes.

draft--subject to revision

## References

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FISH AND WILDLIFE SERVICE  
Fish and Wildlife Enhancement  
Sacramento Field Office  
2800 Cottage Way, Room E-1803  
Sacramento, California 95825-1846

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In Reply Refer To:  
1-1-92-SP-1189

Memorandum

To: Chief, Division of Planning and Technical Services, U.S. Bureau of Reclamation, Sacramento, California (Attn: Ms. Carol Sakamoto)

From: *Acting* Field Supervisor, Sacramento Field Office  
Sacramento, California (SFO)

Subject: Species List for the Proposed Red Bluff Diversion Dam Pumping Plant, Sacramento River, Tehama County, California

As requested by letter from your agency dated July 30, 1992, you will find attached a list of species designated as endangered or threatened under the Endangered Species Act of 1973, as amended (Act), that may be present in the subject project area (Attachment A). To the best of our knowledge, no species proposed for listing under the Act occur within the area. This list fulfills the requirement of the Fish and Wildlife Service to provide a species list pursuant to Section 7(c) of the Act.

Some pertinent information concerning the distribution, life history, habitat requirements, and published references for the listed species is also attached. This information may be helpful in preparing the biological assessment for this project, if one is required. Please see Attachment B for a discussion of the responsibilities Federal agencies have under Section 7(c) of the Act and the conditions under which a biological assessment must be prepared by the lead Federal agency or its designated non-Federal representative.

Section 7 consultation, pursuant to 50 CFR § 402, should be initiated if you determine that a listed species may be affected by the proposed project. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to a listed species. If a biological assessment is required, and it is not initiated within 90 days of your receipt of this letter, you should informally verify the accuracy of this list with our office.

Also, for your consideration, we have included a list of the candidate species that may be present in the project area (See Attachment A). These species are currently being reviewed by our Service and are under consideration for possible listing as endangered or threatened. Candidate species have no protection under the Act, but are included for your consideration as it is possible that one or more of these candidates could be proposed and listed before the subject project is completed. Should the biological assessment reveal that candidate species may be adversely affected, you may wish to contact our office for technical assistance. One of the potential benefits from such technical assistance is that by exploring alternatives early in the planning process, it may be possible to avoid conflicts that could otherwise develop, should a candidate species become listed before the project is completed.

X to CUP ENV 4 CO

Classification	PRJ 13 CO
Project	CUP
Control No.	95013282
Field No.	2380
Agency	DAM

Please contact the Section 7 Coordinator of this office at (916) 978-4866, if you have any questions regarding the attached list or your responsibilities under the Act. For questions concerning the threatened winter-run chinook salmon, please contact Jim Lecky, Endangered Species Coordinator, National Marine Fisheries Service, Southwest Region, 501 West Ocean Boulevard, Suite 4200, Long Beach California 90802-4213, or call him at (301) 980-4015.

*Gail C. Koshetich*  
for Wayne S. White

Attachments

cc: FWS-SFO (Wetlands), Sacramento, CA

ATTACHMENT A

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED  
PILOT PUMPING PLANT AT RED BLUFF DIVERSION DAM -  
SACRAMENTO RIVER, TEHAMA COUNTY, CALIFORNIA  
(1-1-92-SP-1189, August 25, 1992)

Listed Species

Fish

winter-run chinook salmon, *Oncorhynchus tshawytscha* (T)

Birds

bald eagle, *Haliaeetus leucocephalus* (E)

Invertebrates

valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (T)

Proposed Species

None

Candidate Species

Fish

sacramento splittail, *Pogonichthys macrolepidotus* (2)  
green sturgeon, *Acipenser medirostris* (2R)

Amphibians

california red-legged frog, *Rana aurora draytonii* (1#)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (2)

Mammals

pacific western big-eared bat, *Plecocus townsendii townsendii* (2)

Plants

silky cryptantha, *Cryptantha crinica* (2)  
adobe lily, *Fritillaria pluriflora*

- (E)--Endangered (T)--Threatened (P)--Proposed (CH)--Critical Habitat  
(1)--Category 1: Taxa for which the Fish and Wildlife Service has sufficient  
biological information to support a proposal to list as endangered or  
threatened.  
(2)--Category 2: Taxa for which existing information indicated may warrant  
listing, but for which substantial biological information to support a  
proposed rule is lacking  
(1R)--Recommended for Category 1 status  
(2R)--Recommended for Category 2 status  
(#)--Listing petitioned  
(\*)--Possibly extinct

FEDERAL AGENCIES' RESPONSIBILITIES UNDER  
SECTIONS 7(a) and (c) OF THE ENDANGERED SPECIES ACT

## SECTION 7(a) Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species; 2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species; and 3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) Biological Assessment--Major Construction Activity<sup>1</sup>.

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action<sup>2</sup> on listed and proposed species. The process begins with a Federal agency requesting from FWS a list of proposed and listed threatened and endangered species. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may proceed; however, no construction may begin.

We recommend the following for inclusion in the BA: an on-site inspection of the area affected by the proposal which may include a detailed survey of the area to determine if the species or suitable habitat are present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirements; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of indirect effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

<sup>1</sup> A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332(2)(C)).

<sup>2</sup> "Effects of the action" refers to the direct and indirect effects on an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action.